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(Assisted by several Scientific Gentlemen.)

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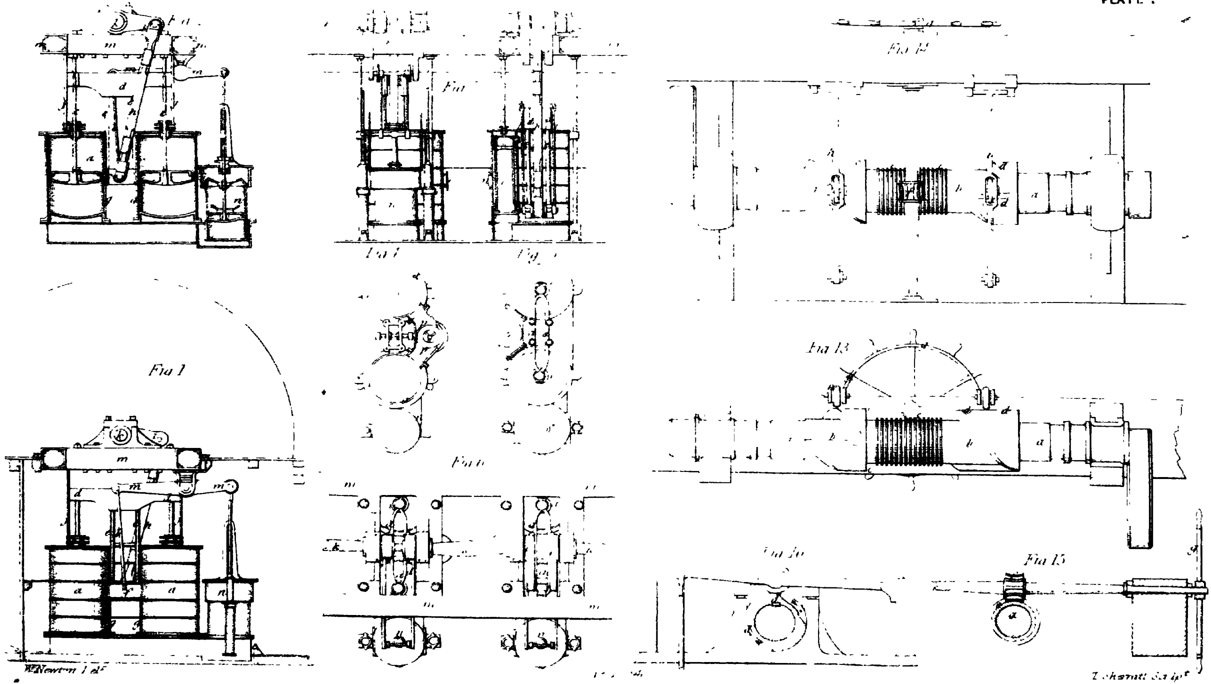
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Wm Newton Delt
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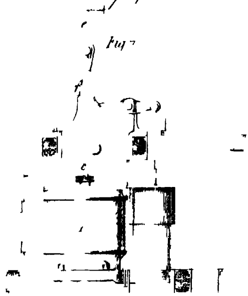
Maudslay & Field's Imp^d. Marine Steam Engine

Fig 7



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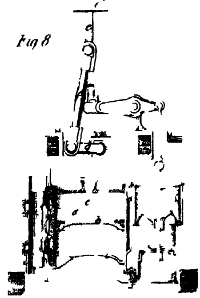

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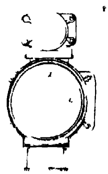
Fig 10



Fig

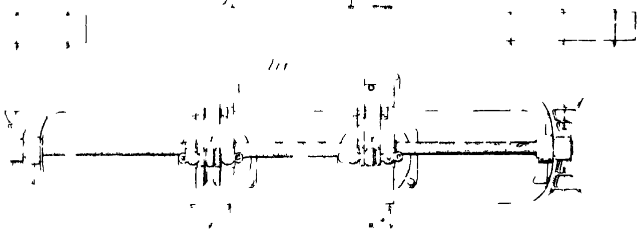
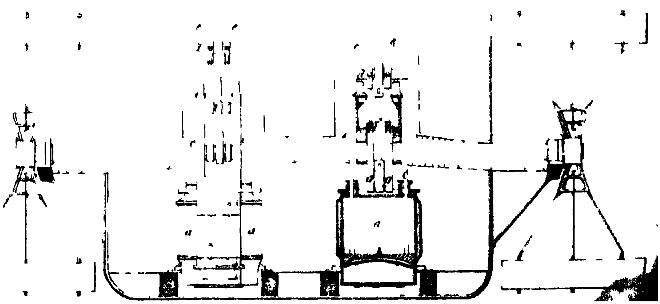
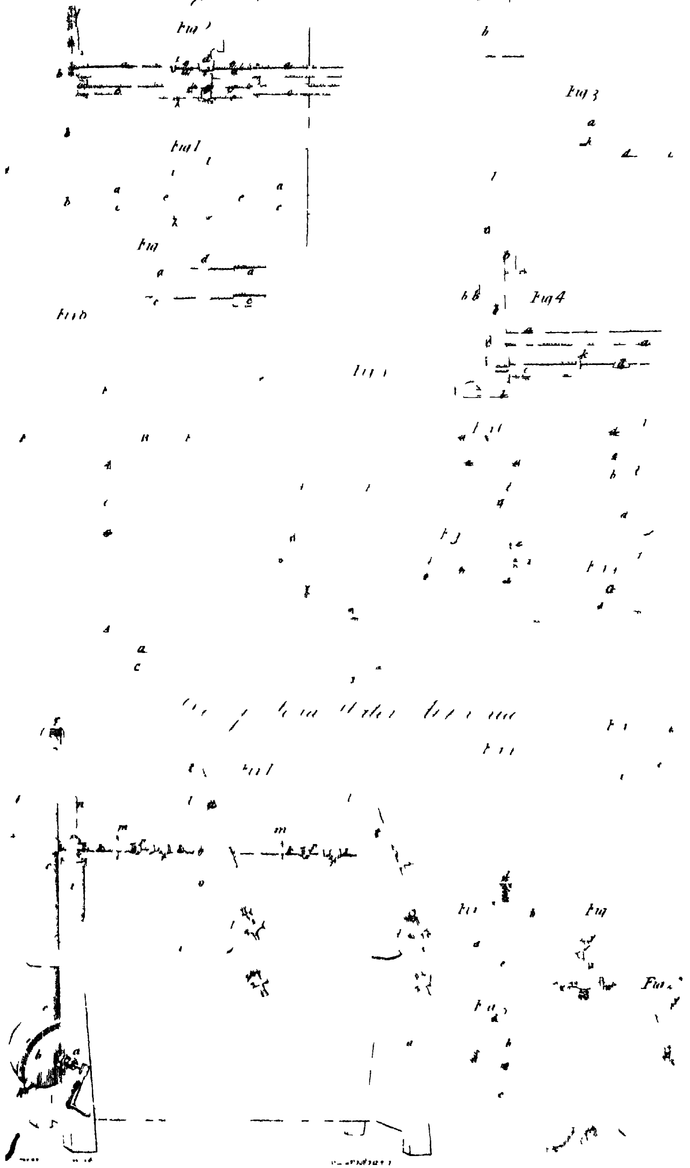
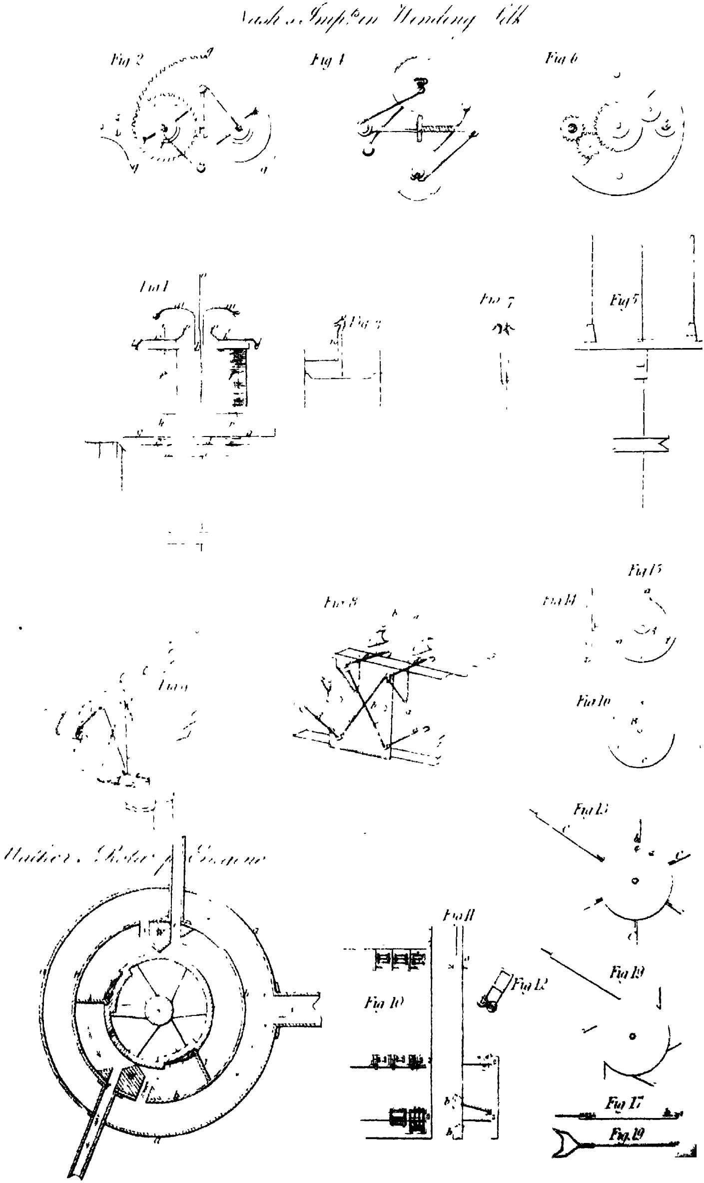


Fig 1



Gurney & Rixon's Bude Light

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THE

JOURNAL AND REPERTORY

OF

Arts, Sciences, and Manufactures.

CONJOINED SERIES.

No. CIV.

Recent Patents.

To Joseph Maudslay *and* Joshua Field, *of Lambeth, in the county of Surry, engineers, for their improvements in the construction of marine steam-engines, which are particularly applicable to steam-engines of the largest class.*—[Sealed 7th May, 1839.]

These improvements in the construction of marine steam-engines are particularly applicable to those of the larger class, and are designed principally for the purpose of producing and applying a greater amount of steam power than has heretofore been available within a given space or area on shipboard. This is effected by different constructions, arrangements, and proportions of the parts of low pressure engines, allowing a more perfect application of the expansive force of steam without increasing the weight of the whole machinery.

The first feature of these improvements consists in adapting two steam cylinders to one engine, in such a way, that the steam shall act simultaneously upon both pistons, in order that they may be made to rise or fall together, the piston rod of each being attached to one horizontal cross-head, and thereby the combined action of both pistons applied to one crank of the paddle shaft.

The second feature of these improvements applies more particularly to engines for river navigation, and consists in the adaptation of a piston with two rods, working in a steam cylinder of large area, both piston rods being connected to one cross-head above, which gives motion to the crank below it, by a single connecting rod.

The third feature of these improvements consists of a method of adjusting the expansion valves of combined engines, by which the period for shutting off the steam, at any part of the stroke, may be regulated in both engines at once by a single movement, whilst the engines are working.

The fourth feature of these improvements is the peculiar construction of the main beams of the framing that carry the plummer blocks of the main crank shaft to which the paddle wheels are attached. These beams are formed as hollow trunks, by the combination of wrought-iron plates, attached to bars of angle iron, in the same way as ordinary boilers are made; and by that means beams may be constructed of the largest dimensions, of unlimited strength, and of comparatively small weight.

These improvements will be more fully understood by reference to the accompanying drawings, and the following description thereof, see Plate I., in which fig. 1, is an elevation, taken longitudinally, representing an engine with two cylinders, constructed upon the plan described as the first feature of these improvements; fig. 2, is a vertical

section of the same, taken through the cylinders; fig. 3, is a horizontal view of a pair of engines, in which the situation of the engine, shewn at fig. 1, is seen, as it would appear when looking upon it from above; fig. 4, is a corresponding engine, placed at the other side of the vessel, but represented in section, cut horizontally through the cylinders; fig. 5, is a vertical section, taken transversely through a steam vessel, shewing the positions of two engines, as in figs. 3 and 4, the one engine being in section, the other an external view, seen upon a plane in advance of the former; and fig. 6, is a plan or horizontal view of a portion of the steam vessel, with the engines and their appendages; and also the framing, by which the crank shafts of the paddle wheels are supported, similar letters referring to the same parts of the machinery in all the preceding figures.

The two connected working cylinders are shewn at *a, a*; their pistons at *b, b*; and the piston rods at *c, c*,—the upper ends of which rods are affixed by keys to the cross-head *d*. Four vertical rods *e, e, e, e,* affixed at top to the cross-head *d*, are connected at bottom to a slider *f*, which slider is enabled to move up and down on the guide ribs *g, g*, formed on the outer surfaces of the cylinders.—To this slider *f*, one end of a connecting rod *h*, is attached, the other end of that rod being attached to the crank *i*, of the propelling shaft.

From this arrangement it will be perceived, that by the simultaneous ascent and descent of the two pistons *b, b*, in their working cylinder *a, a*, the rods *c, c*, will cause the cross-head *d*, to move perpendicularly up and down between its guide bars *j, j*, and in so doing to raise and depress the slide *f*, with the connecting rod *h*, which rod will, by that means, be made to give rotary motion to the crank *i*, and thereby cause the paddle wheel shaft *k*, to revolve. A rod *l*, connected to the slide *f*, will, at the same time, work

the lever *m*, to which the rod of the air-pump *n*, is attached.

The mode of adapting the steam valve of the combined cylinders *a*, *a*, is best seen in figs. 3 and 4. The steam is admitted to and withdrawn from these cylinders by one slide valve common to both, through a pipe *n*, seen in fig. 5. From this pipe *n*, the steam proceeds through a slide valve *o*, of the ordinary construction, and through the curved passages or tubes *p*, *p*, into both cylinders. There is also a *narrow* passage of communication always open at *q*, by which the steam is allowed to pass from one cylinder to the other for the purpose of keeping the pressure equal at all times in both cylinders.

The expansion valve is on the steam pipe *n*, at the entrance to the slide valve; the slide is moved by an excentric in the ordinary way, and the expansion valve is regulated by the means described hereafter, under the third feature of our invention.

The advantages proposed by this arrangement, are simplicity of construction, more direct action on the crank, saving of space and weight of material, offering easy means of giving larger area of cylinder, whereby a given amount of steam can be used more expansively than in former arrangements, and consequently yield more power and economise fuel,—with the further advantage at sea, that when the engine is reduced in the number of its strokes by deep lading of coal, as at the commencement of a voyage, or by head winds, more steam may then be given to the cylinders, and, under such circumstances, more speed to the vessel,—all the steam generated in the boiler being usefully applied.

The second feature of our invention, viz. the improved construction of steam-engines, having two piston rods working in one cylinder, is represented at Plate II., in

the several figs. 7, 8, 9, 10, 11, and 12. Fig. 7, is an elevation of the engine; fig. 8, a section of the same, taken vertically through the cylinder to the slide valve and the air-pump; fig. 9, is a horizontal view of the top of the cylinder valve-box and air-pump of these improved engines; fig. 10, is a horizontal section, taken through the cylinder of a similar engine on the other side of the vessel; fig. 11, is a section, taken transversely through a steam vessel, shewing the positions in elevation of the two engines mentioned in the preceding figures,—the cylinder of one being in vertical section, the other an external view, taken upon a plane in advance of the former, with the crank, shaft, and paddle wheels; and fig. 12, is a horizontal view, as seen from above, of the two engines and their appendages.—The same letters of reference pointing out similar parts of the machinery in all the six last-mentioned figures.

The cylinders of large area are shewn at *a*, *a*,—and *b*, are their pistons. *c*, *c*, are two perpendicular rods inserted into each piston, and working through stuffing boxes in the lid of the cylinder. *d*, is a cross head, to which the two piston rods are keyed at top; and *e*, *e*, are the guide rods, fixed on cast-iron supports, upon which rods the cross head *d*, slides up and down. The connecting rod *f*, is attached above to the cross head, and below to the crank *g*, *g*, on the paddle shaft. The other parts of the engines will appear so obvious, from inspecting the drawings, as not to require further description.

It will be perceived that by this arrangement of the parts of the engine, motion is given to the crank shaft, below the cross head, by a single connecting rod.

The advantages resulting from this improvement, are, that a paddle shaft, placed at a given height from the bottom of the vessel, will be enabled to receive a longer stroke

of the piston than by any other arrangement now in use; a more compact and firm connection of the cylinder with the crank shaft bearings is effected, and a cylinder of much greater diameter may be applied, by which the principle of working steam expansively, may be more fully carried out, and a more direct action of the steam power on the crank obtained, with a less weight of materials and a greater economy of space than has heretofore been obtained by any of the arrangements of marine engines in use.

The third feature of our invention, viz., the method of adjusting the expansive valves of combined engines, will be seen by reference to Plate I., figs. 13, 14, 15, and 16.

In these figures, 13 represents the central portion of the double crank shaft of a steam vessel, with the parts appended, by which the above object is effected, as they would appear in elevation. Fig. 14, is a horizontal view of the same. Fig. 15, is an elevation taken at right angles to fig. 13, about the middle of the shaft, which is here shewn in section; and fig. 16, is an elevation also at right angles to fig. 13, shewing one of the cams upon the shaft in section, by which the lever and rod of the expansion valve is worked,—the respective letters referring to the same parts of the machinery in these last mentioned figures.

The central part of a double crank shaft is shewn at *a, a,* supposed to be adapted to a pair of engines. *b, b,* is a tube or socket, sliding horizontally upon the shaft, but prevented from turning upon it by a rib on the shaft taking into a long groove in the socket.

This tube or socket has two small snail cams *c,* and *d,* affixed to it or cast upon it, and in the centre, between the cams, a series of rings or flutes *e, e,* are also formed upon the tube. A spindle, placed at right angles to the main crank shaft, has a pinion *f,* the teeth of which take into the rings or plates *e, e,* (shewn also detached at fig. 15,)

and by turning this spindle and pinion *f*, (which may be done by a hand wheel *g*,) the tube *b*, *b*, with its snail cams, will be slidden upon the main crank shaft, to the right or left, as may be required.

Upon the periphery of the snail cams *c*, and *d*, the anti-friction rollers in the levers *h*, and *i*, are intended to work, (as shewn also in the detached fig. 16.) The rods from these levers *h*, and *i*, are connected to the expansion valves of the two engines below, and hence by the action of the cams *c*, and *d*, against the levers *h* and *i*, as the main shaft *a*, revolves, the expansion valves are opened and closed.

Let it be supposed, that by turning the pinion *f*, the tube or socket *b*, *b*, (seen in figs. 13, and 14,) has been slidden toward the left, as far as it will go; then, as the main shaft revolves, the uninterrupted circular periphery of the cams *c*, and *d*, will act against the levers *h*, and *i*, so as to keep them in their elevated positions,—consequently the expansion valves will, under those circumstances, remain open. If however it is desirable to shut off the steam during a part of the rotation of the main shaft, we turn the pinion *f*, so as to slide the tube *b*, *b*, with the cams *c* and *d*, toward the right in fig. 13 and 14.

When this is done, only a portion of the circular periphery of each cam will be enabled to act in holding up the levers; for, as the main shaft with the cams revolve, the roller of each lever *h*, or *i*, will, when the snail or curved edge of the cam comes under the roller, allow the lever to fall, and by so doing to close the expansion valve, and shut off the steam from the working cylinder, until the roller rises again up the opposite edges of the snail, and gets on to the larger radius of the cam, when the lever will be raised, and the expansion valve opened, allowing a free passage to the steam.

In this way the cams may be slidden still farther to the

right, and cause so small a portion of the larger radius of the cams to act against the levers, as to shut off the steam during the greater part of the rotation of the main shaft.

By this apparatus we are enabled to regulate the flow of the steam into both engines at once, by one simple movement of the spindle and pinion, and without interrupting for a moment the working of the engines; such a means of adjustment being highly important in bringing into operation the full effect of steam, applied upon the expansive principle, in economising fuel, and adapting the power of engines to the varying circumstances at sea, between light and heavy lading, and between strong head wind and scudding before the gale.

The peculiar construction of main beams for supporting the crank shafts, mentioned in the fourth feature of our invention, are formed by combining long flat plates of rolled iron, which we unite to long bars of iron, turned up at right angles, or what is commonly called angle iron. The plates are firmly attached to these bars by rows of rivets, in the ordinary way of making wrought-iron boilers. Such beams may be extended to any length, and made into any form required, and applied as at *m, m, m,* in figs. 1, 2, 5, and 6; and the bearing and other parts of the engines may be attached to these beams, as shewn in the drawings. These beams may be made of unlimited strength, and with a comparatively small weight of material.—[*Inrolled in the Rolls Chapel Office, November,* 1839.]

Specification drawn by Messrs. Newton and Berry.

To Goldsworthy Gurney, *of Bude, in the county of Cornwall, Esquire, and* Frederick Rixon, *of Cockspur-street, Pall Mall, in the county of Middlesex, for their invention of improvements in the apparatus for producing and distributing light.*—[Sealed 8th June, 1839.]

This invention of improvements in the apparatus for producing and distributing light, is applicable to lamps or burners, wherein oil or oleaginous matters, in a liquid state, are the materials consumed for producing the illumination; and our improvements also apply to various kinds of lamps, burners, or lights, wherein the inflammable gas or vapour obtained by the distillation of coal, oil, resin, asphaltum, or other bituminous, resinous, or oleaginous matters is used, as the material for illumination; such gases or vapours being previously obtained, and then conveyed to the lamps or burners by pipes from a reservoir or gasometer; and consists, in the first place, in improved arrangements and constructions of conducting pipes or tubes and cocks, and jets or burners, whereby we are enabled to introduce into the interior of the flame of such lamps or burners, a stream or jet of pure oxygen gas. The atmosphere or atmospheric air being carefully excluded therefrom, that is, from passing through the burner, or into the interior of the flame. This jet or stream of pure oxygen is applied or given to the flame for the purpose of producing a more intense ignition of the carbonaceous matters, and consequently a more brilliant light than can be obtained where atmospheric air alone, or a mixture of atmospheric air and inflammable gases, are used to cause cumbustion.

It may be proper here to remark, that we are perfectly

well aware that mixtures of air and inflammable gases have been applied to flame for the increased production of heat, and in certain cases to produce light, (in a peculiar description of lamp) which lamps burn the vapour or gas arising from the liquids contained within themselves; we therefore wish it to be distinctly understood, that our improvements have nothing whatever to do with such mixtures of atmospheric air and inflammable gases.

And we are also aware, that pure oxygen has been applied to hydrogen gas for the purpose of producing intense heat for blow-pipe purposes, and on lime for producing light; we therefore desire it to be understood, that our invention only applies to administering to the flames of oil or gas lamps, or burners, a jet or stream of pure oxygen, which, of itself, is not inflammable; but, when applied to the flame in the manner hereinafter described, and at the proper place, will produce intense or bright and clear light, which is caused by the oxygen or supporter coming into contact with the combustible bodies or inflammable gases, at the point of ignition. Therefore, as regards our invention, this jet or stream of pure oxygen may be called the source or cause of the extra light given out; and we have, therefore, in contra-distinction to all other lights, called this "The Olio-oxygen, or Bude Light."

And secondly, our improvements consist in the application and use of peculiar and novel constructions and arrangements of apparatus, whereby flashing or intermitting lights may be caused, or produced, and used as signals for locomotive steam-engines or carriages, and steam or other vessels, or other situations where they may be required; such intermitting or flashing lights being caused or brought into operation by the passage of streams or bubbles of pure oxygen through flame, when brought in connection therewith, or of inflammable gases when burnt alone without the jet

or stream of pure oxygen, such bubbles of inflammable gas being ignited by a small stationary and continuous light; the bubbles of gases being produced by their passing through an inverted syphon, containing liquid, acting as an hydraulic valve. Or the same effect may be caused by the actuating power of machinery or an engine, and may therefore be made capable of indicating the speed at which a locomotive engine or steam vessel is travelling, by the rapidity with which the flashes are repeated.

This effect may be produced by any proper arrangements of mechanism depending on the revolution of the wheels, or the strokes of the engines, or other moving part of the machinery; or in the former case by increasing or diminishing the column of liquid in the inverted syphon, and thus causing a greater or less resistance to the passage of the gas. The same effect may also be produced by altering the capacity of the gas and water tubes, and thereby causing a quicker or slower pulsation of the light.

Having thus stated the nature and objects of our invention, we will proceed to describe the various improved mechanism or apparatus connected therewith, referring to the accompanying drawings the better to illustrate the same. (See Plate III.)

Fig. 1, is a side view of one arrangement and construction of conducting pipes and cocks, fitted with a jet burner, as applicable to one modification of the *first part* or section of our improvements; that is, as employed for the burning of different kinds of inflammable gases; fig. 2, is a section, taken longitudinally through the pipes, cocks, and burners, to shew the channels and passages in the interior; fig. 3, is a side view of an arrangement and construction of the apparatus, as adapted to another modification of this first part of our invention, that is, as applied to oil lamps; and fig. 4, is a section of the same. *a*, is the pipe or tube,

through which the inflammable gas or oil is to pass to the burner or jet *b*. This pipe may lead from the street main, or supply gas pipe, gasometer, or oil or gas reservoir, or other source, as the case may be. *c*, is the pipe through which the pure oxygen or non-inflammable gas is to pass, or be conducted to the jet or burner,—this pipe may lead from any suitable apparatus for obtaining the pure oxygen, or from a reservoir containing that gas.

The oxygen pipe *c*, is connected by an air-tight joint to the lower part of the burner or jet *b*, and passes up the interior thereof, (as shewn in the drawing,) its mouth or exit aperture being on a level, or a little below that of the burner or surrounding flame.

Both of the pipes *a*, and *c*, where inflammable gas is used, must be furnished with stop-cocks, to cut off or supply the two distinct gases.—These cocks may be placed separately on the pipes *a*, and *c*, or they may be constructed, as shewn in figs. 1 and 2; that is, with one plug *d*, serving for both pipes, they being connected by air-tight joints to the separate channels *a*,* and *c*,* in the piece of metal *e*, *e*. The plug *d*, has two apertures *f*, and *g*, bored through it, which are opposite, and answer to the channels *a*,* and *c*;* the bore of these apertures should be somewhat smaller than that of the passages *a*,* and *c*,* to allow for wear in the parts, or tightening down the plug.

It is desirable that the apertures *f*, and *g*, should be so arranged, that the oxygen may be let on a little before the inflammable gas, and also shut off a little after it. This is readily done by making the apertures *f*, for the inflammable gas, a little smaller than the other.

It is requisite, in order to carry this part of our improvements into proper effect, that the two streams or jets of inflammable gas, and pure oxygen or supporter, should flow in proper proportions one to the other, therefore the pipes

or channels *a*, and *c*, must be furnished with regulating cocks, or set screw plugs, by which their capacity, or the passage of the gases through them, shall be determined.

These regulating cocks or plugs may be placed in any convenient part of the pipes *a*, and *c*, but we prefer them to be placed, as shewn in the drawing, that is, in the piece *e*; the screw-plug *i*, being for regulating the capacity of the channel *a*, and the plug *k*, for the pipe *c*. By screwing the ends of these plugs into or out of the channels, there will be more or less passage for the gases, and the flow thereof to the burner will be thereby regulated to the required proportions, so as to produce the desired effect.

Figs. 3 and 4, are representations of this part of our invention, as applied to the burner of a lamp, wherein oil, in the fluid state, is consumed for illumination;—fig. 3, being a side view, and fig. 4, a section, taken vertically through the same. *a*, is the pipe or tube, leading from the oil reservoir of the lamp to the circular channel within the burner *b*, which, in this instance, is made like a common Argand burner, excepting that the bottom part is closed, so that *no* atmospheric air can pass up the interior. The burner is furnished with a cotton and means of adjusting its height, together with a gallery to hold a glass chimney, as usual. *c*, is the pipe for the passage of the pure oxygen from the reservoir to the flame,—it is passed through the side of the burner by an air-tight joint, and extends upwards within the burner, as shewn in the drawing. The oxygen pipe is furnished with a regulator, plug, or stop-cock, at *k*, and also with the other cock at *d*, for the purpose of giving the supply of oxygen to the lamp when it is once lighted, and cutting off the same when it is to be put out. *l*, is a moveable cup, screwed air-tight to the bottom of the burner, which serves for the purpose of stopping up the end of the middle channel, and receiving any deposit from the oil or flame.

Fig. 5, shews a section of the pipes, and the cutting off and supply cocks *d*, which, in this instance, have their plugs separate from one another, but are turned simultaneously by one handle,—the end of one of the plugs being keyed or counter-sunk into a mortice in the other, so that they must move together, although they may be set up or tightened separately, as may be required.

The second part of our invention will be illustrated by figs. 6, 7, 8, 9, and 10, which are different views of some modifications of our improved apparatus for producing flashing or intermitting lights for signal purposes;—these figures will serve to explain this part of our invention.

There are two ways of obtaining or producing this effect; the *one* is by the *simple action* of bubbles or globules of gases passing through liquids; that is, of inflammable gas, when this alone is used to cause the light, and also of the pure oxygen when the flame of other matters is used in conjunction therewith, the bubbles of either the inflammable or non-inflammable gases passing from the supply pipe through an inverted syphon or chamber, containing a column of liquid, which, acting as an hydraulic valve, (the column being displaced before the bubble can pass,) interrupts the passage of the gases through the pipe, and produces pulsation at the burner. The *other* method is to obtain the same effect by mechanical means, by alternately exposing and hiding, or nearly shutting out the light. The effect of this mechanical operation may be obtained by placing a revolving or moving shade around the flame of the lamp, which shade shall hide the light, except at a part desired, say all but through an aperture in the side of the shade. This aperture being furnished with a reflector to throw the light to a distance, and as the shade and reflector revolve around the flame, it will have the appearance or effect of a flashing or intermitting light to any person

placed before or behind it; or the same effect may be produced by alternately opening and shutting the door of a darkened lanthorn containing the light.

Another arrangement of mechanism for producing the same effect, is by means of a supply and cutting-off cock or valve, placed in the gas pipe when the inflammable gases are used alone, or the oxygen when used with the flame of other bodies; which cock is to be alternately opened and closed by some suitable connection with the machinery, and by thus alternately supplying to and cutting off the inflammable gas, or the oxygen, as the case may be, from the flame, produce a flashing, interrupted, or intermitting light.

When the inflammable gas is used for this purpose, there must be a small continuous flame in such position that the bubbles of inflammable gas, as they come in contact with it, will catch fire, and the flashing light thereby be produced; and when pure oxygen is used, the flame of the oil or other matters being kept continually alight, its intensity will be increased or diminished as the oxygen is supplied thereto or cut off therefrom.

Fig. 6, is a sectional diagram, which will suffice to explain one arrangement and construction of apparatus, whereby the method of causing the intermitting or flashing light, by interrupting the passage of the gas or oxygen from the reservoir to the burner or flame, is effected, by means of a column of fluid being placed in its way. Let *a*, be the gas pipe, which is connected, air-tight, to the closed chamber or well *b*, containing a given quantity of water or oil; the pipe *a*, is carried down to near the bottom of the chamber, where its end is turned up, and opens into the inner tube *c*, which serves as a guide for the bubbles as they arise, and determines the time of pulsation, or passage of the bubbles, by its area; or the same may be determined by the height of the column of fluid. *d*, is the pipe for

conducting the oxygen or inflammable gas from the chamber *b*, to the burner.

It will be evident, that if the pressure of gases in the reservoir is properly regulated according to the height of the column of water in the chamber *b*, (or vice versa,) the gases will only be able to escape from the pipe *a*, through the chamber to the burner in bubbles, or only at intervals, or whenever the pressure of the gases has overcome the weight of the column of water, and forced it out of the pipe *a*, into the chamber *b*, and thus allowing the escape of the gases to the burner only at intervals. *e*, is a pipe, furnished with a funnel and stop-cock, by which liquid can be introduced into the chamber *b*; and *f*, is a pipe and cock whereby it can be withdrawn.

Fig. 7. shews another diagram of a different modification of a similar kind of apparatus, in which this effect will be produced;—the same letters being marked on corresponding parts to fig. 6, no further description will be necessary.

This interruption of the flow of the gases can be obtained by several other modifications of apparatus, wherein water or oil is opposed to the direct or continuous flow of the gases, the fluid having to be displaced by the force of the gas before it can pass,—the water or oil returning after each portion of gas has effected its escape; therefore it will not be necessary for us to describe all such modifications of the simple apparatus; but we will proceed to describe one or two modifications, or arrangements, or constructions of the mechanical means to be employed to produce this effect.

Fig. 8, is a vertical section of a modification of apparatus, consisting of a revolving shade or reflector, placed around the flame of the lamp, which will prevent the transmission of light, excepting through the face thereof; and as this reflector turns around the stationary light, it will throw

the rays of light in different directions, and by being enclosed in a dark lanthorn, with only one face or part open, will have the appearance of an interrupted or flashing light to any person stationed before or behind it. A, is the jet or burner, which is fixed in any convenient situation, and is furnished with all the requisite pipes and tubes for oil or gases, as described above; B, is the hood or reflector, fastened to the tube C, which surrounds the burner, and rests on a shoulder or ledge formed upon it. Rotary motion is to be given to this tube and reflector by any convenient mechanism connected with the machinery, as by a band passed from a pulley, or any rotary part of the engine or machinery, to a pulley G, on the tube C. E, is a chimney for c[illegible]ying off vapour; F, is the outline of a lanthorn for keeping the flame steady, and preventing the action of a current of air upon the light.

The same effect of flashing or intermitting light, may be produced by alternately opening and closing a door or shutter in a dark lanthorn, enclosing the flame, and may be done by a suitable machine, having an alternate motion from any part of the machinery.

Fig. 9, shews a section of a lamp and apparatus, whereby the intermitting or flashing is produced in a stationary lanthorn and continuous light, but in which the supply cock of the oxygen pipe is alternately opened and closed, whereby the intensity of the flame is increased or diminished, as the admission of the oxygen is allowed to pass to, or is cut off from, the flame.

This figure shews a vertical section, taken through an oil lamp A, adapted for this purpose, and furnished with a moveable reservoir of oil B, and cotton wick burner C, in the ordinary manner. *c*, is the pipe or channel for the pure oxygen, leading from the reservoir to the top of the burner into the interior of the flame. The part of this

pipe, between the lamp and the cock, may be made either of metal or flexible material, as circumstances may require. *d*, is the supply and cutting-off cock or valve, which, in this instance, is intended to have a rotary or interrupted rotary motion given to it by means of the pulley G, on its plug; but a common slide-valve or cock, alternately opening and closing by means of a reciprocating or alternating motion, obtained from the machinery, may be placed in the same situation, and will produce the same effect. The lamp or lanthorn A, may be fixed in any required position, and when flexible tubes *c*, are used, may be made to take on and off its fittings when required. The seat or bed of the cock or valve *d*, is to be fixed in any convenient situation on the locomotive engine or vessel, and a rotary or alternating rotary motion given to it, by means of a band or strap passed to the pulley G, from any revolving part of the machinery, or by a toothed rack connected with and actuated by any part of the machinery, which has a regular alternating or reciprocating motion; or the same effect may be produced by an excentric, connected by a rod to a crank on the plug *d*, all of which modifications or arrangements are so well understood, that it is not necessary for us to describe them.

Fig. 10, shews a section of an arrangement and construction of apparatus in which the common slide-valve is applied to this purpose. *a*, is an air-tight box or chamber, divided into two compartments by the partition *b*, which has an aperture through it, opening into both chambers, covered by the slide-valve *c*, connected to rods *d*, passed through stuffing boxes in the sides of the chamber *a*, and receives the alternating or forward and backward sliding motion from the machinery in any convenient manner. *e*, is the pipe for the inlet of the oxygen when the flame of other bodies is used, or that of the inflammable gases when

burnt alone, as the case may be; and *f*, is the exit pipe of the gases to the burner.

Having now described and ascertained our improvements, and the manner of carrying the same into effect, we wish it to be understood, that we do not intend to confine ourselves to the precise forms, or arrangements of construction of apparatus or mechanism, herein shewn, as the same may be varied to suit different circumstances; and we claim as our invention, secured to us by the above in part recited letters patent, as our "improvements in apparatus for producing and distributing light," first, the arrangement and construction of pipes or tubes connected with jets or burners, and furnished with suitable stop-cocks or valves, whereby a jet or stream of pure oxygen is administered or given to the interior of the flame of either oil-wick or inflammable gas lamps; and, in the second place, we claim, as our improvements in apparatus for producing and distributing light, the improved arrangement and construction of apparatus or mechanism, whereby we are enabled to produce an intermitting, or interrupted, or flashing light, to be used as signal lights for railway, telegraphic, and navigation purposes, either by passing the inflammable gas in bubbles, when it is used in connection with a small fixed continuous light, or the pure oxygen when used in the interior of flame, obtained from the combustion of other matters, the pressure of the gas overcoming a column of fluid, and thereby causing pulsation or passing of bubbles, before it can escape to the burner or flame; and also the improved apparatus or mechanism, whereby we obtain the same effect of intercepting the passage of the gas, either inflammable or non-inflammable, to the fixed or continuous flame, by alternately opening and closing the valves, cocks, or taps of the gas pipes, and thereby causing an intermitting or interrupted light; and

also the improved apparatus or mechanism, whereby we obtain the same effect, by the revolving or moving shade or reflector surrounding the light, as hereinbefore described.—[*Inrolled in the Rolls Chapel Office, December,* 1839.]

To WILLIAM NASH, *of Budge-row, in the city of London, merchant, for certain improvements in machinery for winding, spinning, doubling, and throwing silk and other fibrous materials,—being a communication from a foreigner, residing abroad.*—[Sealed 23rd February, 1839.]

THESE improvements in machinery for winding, spinning, doubling, and throwing silk and other fibrous substances, consists in the construction of four different kinds of machines; first, a peculiar arrangement of spindles, bobbins, and conductors, for the preparation or conversion of silk into the states called organzine or tram; second, certain apparatus to be attached to spinning and doubling machines, for the purpose of suspending the doubling operation in the event of one of the threads breaking; third, a machine for winding long reeled silk; and fourth, an expanding swift for winding raw silk, so as to keep it in constant tension.

In the accompanying drawings, fig. 1, Plate IV., represents an elevation of two bobbins, with their appendages, mounted in certain frame-work, for spinning or twisting, and doubling and throwing silk, at one operation. Fig. 2, a horizontal view of the same. A bracket arm *a*, affixed to and extending from the longitudinal rail of the machine, confines and steadies the main spindle *b*, which turns

round freely in a hole formed therein; *c,* is the warve or pulley fixed upon the spindle to receive the band, which gives rotary motion to the spindle. A circular horizontal plate *d,* is made fast to the spindle, and consequently turns with it; and in this plate the dead spindles *e, e,* are affixed, on which the bobbins *f, f,* are mounted.

A circular frame or ring *g,* is, with the bracket *a,* also made fast to the horizontal rail of the machine, in such a position that the main spindle *b,* shall turn exactly in the centre of the ring; the inner circumference of this ring has a circle of teeth, as shewn in fig. 2, and a boss or socket *h,* turning loosely upon each dead spindle *e,* has a pinion or toothed wheel *i, i,* fixed upon it, which takes into the teeth or inner edge of the ring *g.* The upper end of each boss or socket *h,* is wedge formed, fitting into a square central hole in the bottom of the bobbin, so that the bobbin may bear upon and be affixed to the loose socket, and yet turn freely upon the dead spindle. On the top of each bobbin, on the dead spindle, a loose cap piece *k,* is placed, which carries the hook or thread guider *l*; this cap piece is drawn round by the draft of the thread, proceeding from the bobbin to the reel above.

The main spindle *b,* having been put in rotary motion by the driving band, the plate *d,* with the bobbins, will be carried round within the ring *g*; and the pinions *i, i,* upon the sockets *h,* being in gear with the teeth of the stationary ring *g,* will, with the bobbins, be made to rotate upon the dead spindles, and to give an independent rotary motion to each bobbin upon its own axes, in addition to their revolution on the main spindle *b.*

By these means the threads of silk, drawn from the bobbins, will each be spun separately, and, when combined at the hooks above, will become doubled and thrown,—which three processes are thus performed simultaneously by the same operation of the machinery.

The thread or filament, drawn from each bobbin, in proceeding to the receiving or winding bobbin or reel above, passes through the hook or guider *l*, into the cap piece, and through the stationary guider *m*, suspended over the bobbin, and thence under the central hooks *n*, and *o*, where the doubling and throwing process commences. The construction of the central hooks, and their mode of operating upon the threads, will be best seen by reference to the auxiliary fig. 3. The hook *n*, is fixed, and stands firm and erect, but the hook *o*, is loose, and capable of falling over toward either side, it being kept up by the tension of the threads passing under it. In the event of one of the threads breaking, the centrifugal force produced by the rotation of the spindle, will cause the hook *o*, to fall over on that side which is not supported, toward the unbroken thread; and then an arm *p*, extending from the cap piece *k*, will, as the bobbin revolves, come in contact with the fallen hook, (as shewn by dots in fig. 1,) which will stop the rotation of the cap piece and guider, and necessarily break the other thread, thereby preventing the doubling and throwing operations from being partially and imperfectly conducted.

I have described the rotation of the bobbins upon their dead spindles, as produced by the toothed pinions, acting in the circular rack. I do not, however, intend to confine my improved construction of machinery to that mode of actuating the bobbins, as it must be obvious that a similar rotary motion might be given to the bobbins by friction, or by bands, or by other constructions of toothed gear, in the manner shewn at figs. 4, 5, and 6, or by any other arrangement or means

And I would remark, that though only two delivering bobbins are shewn in the figures, yet I intend to avail myself of similar modes of driving three or more bobbins in

a set, if required; and when tram only is required to be produced, I dispense with the mechanical contrivances by which the bobbins are made to rotate on the dead spindles. When three bobbins are adapted in a set, I construct the thread-breaking apparatus, as shewn at fig. 7.

Figs. 8 and 9, represent, in perspective, two views of the apparatus, to be appended to a machine for spinning and doubling, by which, in the event of one thread breaking, the other thread will immediately be broken by the falling of a bent lever. In fig. 8, the two threads *a*, and *b*, are shewn severally, passed round a glass friction stud *c, c*, and beneath the upper arms of bent lever hooks *d, d*, and *e, e*. If the thread *a*, should become broken, the upper arm of the lever hook *d*, which is supported by the thread, will immediately fall into the position shewn by dots, and the reverse or lower end of the lever *d*, will come forward, as shewn by dots, and catch hold of the other thread *b*, which, by the rotation of the bobbin below, will instantly break, and so cause the operation of the spinning and doubling to be suspended. Fig. 9, shews the position of the apparatus when this has taken place. Two bent wires or levers *f, f*, are applied for the purpose of raising the lever hooks from the positions shewn in fig. 9, to those in fig. 8.

Fig. 10, represents, in front elevation, part of a machine for winding long reeled silk. Fig. 11, is an end elevation of the same. By means of this machine, long reeled silk (which has heretofore been found so difficult to wind) can, by dividing the hank into several skeins, and folding the skeins over tension rollers into half lengths, be as easily wound as from the short reeled hanks. The skein having been folded into half its length, the two extremities of the skein are passed over the roller *a*, at top, and the middle part of the skein under the hanging roller *b*, at bottom,

and having found the end of the thread, conduct that end to the winding roller *c*, and proceed, as in the ordinary winding process. For lightness, I usually make the rollers, in the lantern, form the upper turning, on fixed axles; the lower on their own pivots, in a lever frame, which is shewn detached, in perspective, at fig. 12. This frame hangs as a lever, and may be weighted for the purpose of keeping the skein of silk always in tension.

The expanding swift, for winding raw silk, is formed by two discs of wood or other fit material A, and B, which being brought together, the arms of the swift C, extend out between them. Fig. 13, shews the swift, so constructed, as it would appear sideways, with the arms extending radially from it; fig. 14, is an edge view of the same; fig. 15, represents the inner surface of one disc A; and fig. 16, of the other disc B. One of the arms C, is shewn detached, in two positions, at figs. 17 and 18. A pin *a*, fixed near the inner end of the arm C, is intended to be inserted into the disc, as at *a*, *a*, *a*, in fig. 15; and similar pins *c*, *c*, *c*, are fixed in the disc B, fig. 16, which last-mentioned pin, when the discs are brought together, as at fig. 14, passes into the slot *b*, formed in the arm C, near its inner ends, and then acts as a guide to determine the position of the arm; that is, whether it shall stand radially, as at fig. 13, or approaching to a tangent, as shewn by dots.

In the centre of the disc A, fig. 15, a coiled spring *d*, is placed, its inner extremity being made fast to the disc A, and the other, or outer extremity, to the disc B, when they are brought together; by then moving back the disc B, upon its centre, that is, causing it to slide round part of a rotation, the pin *a*, will be brought into the situation, shewn by dots, at fig. 13, whilst the pin *c*, remains stationary, and acting in the slot *b*, which throws the arm C,

into the inclined direction, indicated by the dots in fig. 13. In this position, as shewn at fig. 19, all the arms of the swift are intended to stand when the hank is first placed upon it for the silk to be wound off, but the spring continually exerting its force, will, as the silk is drawn off, and the hank expands, bring back the disc B, to its former place, and raise the several arms into radial positions, shewn at fig. 13.—[*Inrolled in the Rolls Chapel Office, August*, 1839.]

Specification drawn by Messrs. Newton and Berry.

To CHARLES CHUBB, *of St. Paul's Church Yard, in the city of London, patent lock manufacturer, for his invention of certain improvements in the means of making secure receptacles for property, such receptacles being either fixed or transportable, and being such as are usually called strong doors, safes, chests, and boxes.*—[Sealed 13th May 1835.]

THE means of safety proposed by the patentee, consist, first, in lining the internal surfaces of wooden doors or boxes with double plates of iron, case-hardened, or of hardened steel, which shall be capable of resisting the entrance of boring tools, or other cutting instruments.

A second feature is proposed for the protection of papers, enclosed in a box, from the action of fire, which consists in lining the box with several thicknesses of case-hardened iron or steel plates, and filling up the spaces between these plates with powdered or small pieces of any material which is a bad conductor of heat, such as charcoal, black lead, broken pottery, sand, or any other such substance. (This scheme has been patented by Mr. Marr.)

A tumbler lock, but not of any novel construction, is to

be attached to the inside of the door or lid of the box, the key-hole of which is to be guarded by a disc of case-hardened iron or steel, to prevent its being bored or cut through; and this disc is to be furnished with certain appendages, answering to tumblers, which will prevent its being turned, except by its own proper key, consequently guarding the lock within from being picked.

Such is the whole matter of the invention,—but the description of which is spun out in a most monstrously long detail, containing, among other extraneous matters, all the processes which are known of hardening iron and steel, and in many places shewing the appearance of several thicknesses of plates put together.—[*Inrolled in the Inrolment Office, November,* 1835.]

To MILES BERRY, *of the Office for Patents, Chancery-lane, in the county of Middlesex, patent agent, and mechanical draftsman, in consequence of a communication made to him by a foreigner, residing abroad, for an invention of improvements in the means of, and apparatus for, manufacturing gaseous liquors, and for filling bottles and other vessels used for holding the same, and retaining the contents therein, and applying the same when required.*—[Sealed 6th December, 1838.]

THESE improvements in the means of, and apparatus for, manufacturing gaseous liquids, and for filling bottles and other vessels used for holding the same, and retaining the contents therein, and employing the same when required, consist, in the first place, in an apparatus for generating or disengaging carbonic acid gas, and communicating the said gas, so disengaged, to other liquids, for the purpose of im-

pregnating them with the air, and thereby producing aerated or gaseous liquors; in the second place, in an apparatus by which bottles or other vessels may be filled with the aerated liquor, and corked tight, without permitting the gas to escape; and in the third place, in a peculiar construction of a portable vessel for holding the gaseous or aerated liquor, and discharging any portions of it into a drinking glass or other receptacle, at such times as it may be required for use at the refreshment table.

In the accompanying drawing, (see Plate IV.,) fig. 1, represents a perspective view of the first-mentioned apparatus, for generating or disengaging carbonic acid gas, and for communicating such gas to the liquor desired to be impregnated. *a*, *a*, is the standard upon which the apparatus is mounted; *b*, is a hollow globular vessel of copper, lined with lead, formed by two hemispheres, connected by flanges and screw-bolts. To the upper part of this globe, a cylindrical or conical tube *c*, of copper, lined with lead, is attached, by secure brazing, riveting, or otherwise. About four-fifths of the interior of the globe *b*, is to be occupied with diluted sulphuric acid, in the proportions of about five parts of water to one of acid, mixed some time before it is used, in order that it may be cool when applied. Into this solution, cartridges made of carbonate of lime, or other suitable material, packed in small paper cases, are to be introduced, for the purpose of generating or liberating the carbonic acid gas; and it may be stated, that the quantity of carbonate of lime used, should be about equal to the weight of the acid.

The upper end of the tube *c*, must be, in the first instance, open, for the introduction of the diluted acid and the carbonate; but, before the commencement of the operation of impregnating the liquor required to be aerated, the aperture must be closed by an iron plug *d*, having a

collar of leather, which plug is to be pressed down by a screw *e*, passed through an iron bridle, attached to the ring on the neck of the tube *c*. The aperture at the top of the tube *c*, being thus closed, the slider *f*, which retains the cartridges in the tube, and prevents them from falling down into the acidulated liquor, must be drawn out, and a sufficient number of the cartridges be allowed, by that means, to descend into the globe; when the winch *g*, being turned, causes an agitator, within the globular vessel, to revolve, and to break the paper cartridges, thereby allowing the acidulated liquor to act upon the carbonate of lime, and to disengage the carbonic acid gas. It should be observed, that both the slider *f*, and the agitator within the globe, must be tinned, in order to prevent the action of the acid upon them; and they must be properly packed, so that the gas may not escape from the vessel. A plug *h*, may be inserted into the lower part of the globe, for the purpose of affording the means of discharging the contents of the vessel when required.

The gas thus generated or liberated in the globe, passes up the tube *c*, and through an aperture in the side, by a small tin pipe, shewn by dots, into the purifying vessel *i*, which vessel must be about three parts filled with water. The gas is thus brought to the lower part of the vessel *i*, and thence bubbling up through the water, becomes washed and purified. From the upper part of this vessel, the gas now proceeds through a horizontal pipe or tube *k*, to the saturating or impregnating cylinders *l*, *l*. The horizontal tube *k*, is furnished with a cock *m*, to shut off or stop the progress of the gas, if required; and to the said tube there is attached an instrument *n*, called a manometer, to indicate the pressure of the gas, as the process goes on.

The pipe or horizontal tube *k*, forms a hollow axle, on which the cylinders *l*, *l*, are allowed to vibrate, their bear-

ings being in the forked arms of the standards *o, o*;—the several portions of the fixed and the moveable parts of the horizontal tube being connected by small pipes *p, p*. The cylinders *l*, must be nearly filled with pure water or other liquor, intended to be impregnated with the gas; which water is to be introduced by turning up the front end of the cylinder, and unscrewing the socket of the cock *q*. The socket of the cock *q*, having been again affixed and made perfectly tight, the gas may be let into the cylinders, by opening the stop-cock *m*, in the horizontal tube, there being a valve in the bush or coupling-piece *r*, opening inwards, which allows the free passage of the gas, but prevents the liquid escaping from the saturating vessel. The cylinder *l*, is then to be put into a state of rapid vibratory motion, for the purpose of causing the gas to mingle intimately with the water or other liquor contained in the cylinder, by which means the liquor will become perfectly aerated or impregnated with the carbonic acid gas, and may then be drawn off by the cock *q*, into bottles or other receptacles for use.

The saturating vessel I prefer to make of copper, completely tinned on the inside; and it should be provided with a cock *s*, for the escape of air, as well as the cock *q*, by which the liquor is discharged. In the interior of the cylinder, a small tin pipe *t*, is inserted, as shewn by dots, which, when the cylinder is in the position represented in the figure, allows a portion of the gas to be withdrawn by the cock *s*. There is also another small tin pipe *u*, within the cylinder, which communicates with the hollow axle, leading to the second cylindrical saturating vessel *e*, the hollow axle being furnished with a stop-cock *m*, and valve *r*, as in the former.

In the positions in which the first cylinder is shewn in the figure, the gas would pass from thence, on the stop-cock being opened, into the second cylinder; but, if the

position of the first cylinder was inverted, then the orifice of the pipe *u*, being in the liquor, the pressure of the gas would force the liquor into the second cylinder, and then, on closing the stop-cock, the latter vessel would retain its saturated liquor, ready for use, whilst the former cylinder was being replenished.

Fig. 2 and fig. 2,* represent the machine for bottling gaseous liquids. To set this machine in operation, it must be previously put in communication with one of the saturating cylinders;—this is effected by means of two leaden pipes, one of which is fixed on the side of the cock *q*, of the saturating cylinder, and the other on the cock *v*, of the bottling machine. The other tube is fixed on the one side to the cock *s*, and on the other to the cock *w*. By the action of this machine the bottle is raised by means of a lever, set in motion by the foot of the operator; the orifice of the bottle is thus pressed against a washer of caoutchouc or leather. The cork is introduced by the aperture *x*, and is pushed downwards by the lever *y*; the cock *w*, is then opened to establish, in the inside of the bottle, the same pressure as in the cylinder; the cock *v*, is then opened to allow the liquid to run into the bottle, which gets filled, and the air ascends, passing through the cocks *w*, and *s*, and occupies the upper part of the cylinder. When the bottle is full, the cork is driven in by the lever *y*, it passing down the copper tube, and enters the neck of the bottle, which is thus filled and corked at the same time. The cork is secured by a cross string or wire, when the operation is finished.

Fig. 3, 3,* 4, and 5, represent the vases or vessels in which all kinds of gaseous liquids may be introduced and emitted at pleasure. To introduce gaseous liquids in these kind of vases, no machinery is requisite. The mouth of the spout, by which the gaseous liquids escape, being of a conical form, it is only requisite to press it into a conical

tube, communicating with the cylinder, and then, by depressing the lever of the vase and opening the cock of the saturating cylinder, the gaseous liquid rushes into the vase or vessel. The air contained in the vase is allowed to escape through an appropriate aperture, closed by an iron stopper.

Fig. 4, shews the manner of filling the vases; fig. 5, the manner of discharging the contents. The vase is represented in side elevation in fig. 3, and may be made of metal, glass, china, or stone ware. It is by the spout that the liquid is introduced and emitted; by pressing on the lever *b*, the liquid is allowed to enter or to escape.

This lever has internally two teeth, similar to those of a pinion; these teeth raise a piston, which is pressed down by a coiled spring, seen in the section, fig. 3.* This piston operates in two ways; first, it closes, by its lower extremity, the hole by which the gaseous liquid is to escape from the vase; and this part may be made of metal as a valve, or of leather, cork, or other material; secondly, it ascends in a stuffing-box, which allows of the piston proceeding upwards, without the liquid escaping; and reaching the spring, (the liquid having no other issue,) and driven by the internal pressure, is forced through the spout *a*.

Inside this vase (see fig. 3,) is a glass tube *c*; it is secured in its upper part, with sealing-wax, to the neck of the vase, for the purpose of causing the liquid to enter and escape by this channel; *d*, is a regulating screw, to give more or less tension to the spring, which maintains the piston in its seat; *e*, is a screw plug, closing an aperture, which allows the air, contained in the vase, to escape;—this aperture serves also to introduce syrups and other liquids, in order to prepare refreshing draughts.—[*Inrolled in the Rolls Chapel Office, June,* 1839.]

Specification drawn by Messrs. Newton and Berry.

To John Swindells, *of Manchester, in the county of Lancaster, manufacturing chemist, for his invention of certain improvements in the manufacture of Prussian blue, prussiate of potash, and prussiate of soda.*— [Sealed 16th April, 1839.]

This invention of an improved method of manufacturing prussiate of potash, prussiate of soda, and Prussian blue, consists in producing the same during the process of manufacturing carbonate of potash, carbonate of soda, and British alkali, commonly called soda ash.

The common method pursued in manufacturing these articles, is by forming a mixture of the sulphate of potash, or sulphate of soda, lime, or carbonate of lime, and small coal, or any other carbonaceous matter, and subjecting them to heat in a reverberatory furnace, and thereby decomposing the sulphates, and producing carbonate of potash or soda; and likewise a quantity of sulphuret of potassium or sodium, according to the article operated upon.

The patentee states, that "in my process I dispense with lime or carbonate of lime, and use, along with the various sulphates, a quantity of ground coal of the best caking description; and also a quantity of iron filings or borings, in manner following, namely:—I take any quantity of the sulphate of potash or sulphate of soda, and fuse them in a reverberatory furnace, such as is commonly used in the manufacture of alkalies; and then I add, by degrees, a mixture of small caking coal and iron filings, (in the proportion of one part of iron filings to eight of coal,) until I have added to the fused sulphate one half of their weight of coal or more, if the sulphates require it, taking care to stir the materials well during the addition of the coal and iron filings, and also for ten or fifteen minutes after the

whole of the coal is added, when the material will be ready to remove from the furnace, and allowed to cool.

I also produce the same results by mixing, in the first instance, the coal and iron filings with the various sulphates, and then fusing them in the furnace in the usual way; or the iron filings may be omitted in the process, but I prefer the addition thereof. The materials, after being cooled, I take and dissolve in water, and when the solution has subsided, I evaporate the same until it has obtained a specific gravity of 1.320, at a boiling heat; then I transfer it into coolers, when the prussiate of potash or prussiate of soda chrystallizes in the course of four or five days; the solution now will consist of carbonate of potash or soda, and sulphuret of potassium or sodium, which sulphuret may be removed by the usual methods employed for that purpose.

The chrystals of prussiate of potash, or prussiate of soda, will be required to be re-dissolved and re-chrystallized, when they will be ready for use or sale; or they may be manufactured into Prussian blue, in the usual way.

Having now fully described my invention, and in what manner the same is to be performed, I desire it to be understood, that I claim, as my invention, the production of prussiate of potash, prussiate of soda, and Prussian blue therefrom, by these methods of decomposing the sulphates of potash and sulphate of soda, by caking coal and iron filings, in the manufacture of potash and soda from these substances, thereby producing both articles by one operation."—[*Inrolled in the Rolls Chapel Office, October*, 1839.]

Specification drawn by Messrs. Newton and Berry.

Original Communication.

(To the Editor of the London Journal and Repertory of Arts, &c.)

EDINBURGH, *Aug. 3rd*, 1840.

SIR,—I must apologize for intruding myself upon your notice, but being rather fond of mechanics, though not a mechanician, I beg to call your attention to the enclosed section of a new form of Rotary Steam Engine, which I think would be well adapted (if practicable) for the lighter purpose to which machinery is applied; and I here subjoin a description:—

a, *a*, *a*, and *b*, *b*, *b*, Plate IV., are two fixed steam-tight cases; *c*, *c*, is also a case, though not fixed, but revolves with the vanes *v*, *v*, which are placed on its outer rim; *x*, *x*, are two recesses, in which the vanes *v*, *v*, lie when passing beneath the wedges *w*, *w*. Two passages *i*, *i*, in the wedges, are for the induction, and two other passages *e*, *e*, for the eduction. *s*, is the steam-pipe, proceeding from the boiler; *y*, *y*, are two springs, placed behind the vanes *x*, *x*, which serve to bring the vanes into erect positions after being pressed down when passing under the wedges.

Now, supposing steam to be admitted from the boiler through the steam-pipe *s*, it would flow between the cases *a*, *a*, and *b*, *b*, and enter the induction pipes *i*, *i*, and pressing on the vanes, would push them round to the opposite wedges, when the steam would escape up the eduction pipes *e*, *e*, and the vanes being pressed into the recesses would pass under the wedge, and regain their upright position by the springs *y*. As the wedges are not placed opposite each other, the one vane having a greater scope than the other, will be in full operation, while the other vane is depressed under the wedge; and having passed it, will then come into operation while the other vane is under the wedge; hence the action will be continued, and the motion equalised, and by which means a fly-wheel can be dispensed with.

As you will now be able to form an idea of its manner of

working, further explanation is unnecessary. If you would favour me with a remark, in your next number, concerning its practicability, you will oblige

Your most obedient Servant,

A. T. MATHER.

We see no other practical objection to the working of an engine on this construction, but that which is found in all rotary engines, (viz.) the difficulty of keeping the joints tightly packed.—EDITOR.

Scientific Notices.

REPORT OF TRANSACTIONS OF THE INSTITUTION OF CIVIL ENGINEERS.

(Continued from page 378, Vol. XVI.)

"On the autogenous uniting of Lead and other Metals." By M. Delbruick.

The term 'autogenous' is employed by the inventor, M. de Richemont, of the method now described, to designate the union of pieces of metal of the same kind with one another without the intervention of the ordinary alloys of tin or other connecting medium. This is effected by directing, by means of a fine beak, the flame of a jet of hydrogen on the parts to be united. A complete fusion of the metal is thus effected, and the parts are united in one homogeneous mass, the metal at the points of junction being in the same state chemically as at the parts untouched. Plates of any thickness, whatever the direction of the edges to be joined, may thus be perfectly united, and the lines of junction

made as strong as the rest of the mass. Many circumstances contribute to render the joints made with common solder objectionable. The rates of expansion and contraction on changes of temperature for lead and its alloys with tin are different; some chemical agents act much more on alloys of lead and tin than on lead alone. The alloys also are fragile, and the solder may not perfectly attach itself, without the imperfection being observed. In addition to obviating these objections, M. de Richemont conceives that his new method of union possesses the farther advantages of economy, in saving of solder, and in avoiding seams and overlappings; in permitting the use of thinner lead, and the use of lead where it is now inadmissible, and in rendering practicable the repairs of vessels which are now impracticable.

M. de Richemont also applies this jet of flame to heating the common soldering irons used by tinmen and plumbers. The jet is permitted to play upon the tool, which, in a few seconds, is brought to the requisite heat, and maintained at that heat without any injury to the tool. The heat can be regulated to the greatest nicety by diminishing or increasing the jet. The author conceives that the sulphate of zinc, produced in the manufacture of the gas, will be found of such value as greatly to diminish the cost of this process.

March 3, 1840.

The President in the Chair.

"Description of the 'Nonsuch' Iron Passage Boat, plying on the Limerick navigation, between that place and Killaloe."

By Charles Wye Williams, Assoc. Inst. C. E.

The attention of Mr. Williams having been attracted to the successful plan for the conveyance of passengers adopted on the Glasgow and Paisley Canal, where light sheet-iron boats, of great length, travel at a speed of nine miles an hour, he was

induced to attempt the introduction of the same system on the Irish canals. A great difficulty, however, presented itself, as the locks there would only admit boats 60 feet long, which length was quite inadequate to the carrying out, with advantage, the principle involved in the long light Scotch boat. To overcome this difficulty, he constructed a sheet-iron boat, 80 feet long and 6 feet 6 inches wide at midships, having the stem and stern ends (each 10 feet long) attached by strong hinges to the body, and susceptible of being rapidly raised to a vertical position by means of winches: thus reducing the length to 60 feet when required to pass through a lock. It is evident that by this means there would be gained not merely the apparent additional buoyancy of 10 feet at each end of the boat, which from the form would not be very effective, but in reality the buoyancy due to an addition of 20 feet of the midship section. The boat thus constructed has been found to answer perfectly; the buoyancy is equal to that of the Scotch boats of similar dimensions; no crankness or unsteadiness accrues when the ends are raised; it is capable of carrying 60 passengers, travelling at a speed of 9 miles per hour, with the same power that was required to draw a 60 feet boat with a less load; and there is a much less action on the canal bank in consequence of the increased length, which at the same time imparts stiffness, and enables passengers to enter and leave the boat with safety. Considerable time is saved in passing the locks, by the opposition of the square end when the bow is raised; the boat may thus be run almost at full speed into the lock, and both ends being raised simultaneously, it is stopped much more easily than if the tapered ends were down. No provision is necessary for keeping the ends down, as the weight of the bow and steersman answers the purpose.

This boat has been working, without intermission, for three years, between Limerick and Killaloe, traversing twice daily a distance of 15 miles, on a navigation of considerable intricacy, and passing 11 locks, without any accident having hitherto occurred.

Mr. Parkes observed that, independent of the advantages of carrying more passengers, by continuing the midship section to the length of 60 feet, considerable speed was gained by the 80 feet boat, in consequence of its fine entrance and run. Mr. Williams informed him that the velocity was found to depend on the position of the boat on the wave; that the rider of the horses employed in towing the boat knew exactly the proper position of the wave with respect to the boat, and regulated the exertion of the horses accordingly—the velocity of the boat and the tractive force depending on the relative position of the boat and wave.

Mr. Field, in reply to some remarks respecting the effect of these rising ends on the buoyancy of the boat, stated that he did not understand it to be Mr. Williams' design to obtain additional buoyancy thereby. The ends only press on the water as much as is due to their own weight, and are principally useful in giving a fine entrance and run to the boat; thus having the whole space between the rising ends for the accommodation of passengers, and obtaining an absolute gain of the whole space that is lifted at each end, as in a boat of the ordinary length there must be the same tapering of the bow and stern ends. So great is the facility in managing the ends, that on quitting a lock the bow end is lowered as the gates are opening; the boat is set in motion at the same time, and as it moves on the stern end is let down, and the usual speed is obtained very soon after it clears the lock. When a lock is to be entered, the boat is suffered nearly to reach the gate at full speed, when the bow end being raised, the additional resistance, caused by the square section being suddenly opposed to the water, stops the boat almost immediately. The weight of one man, at each end, is amply sufficient to keep down the ends when the boat is in motion.

"On the experiments and results of Mr. W. J. Henwood, as to the power of the Huel Towan Engine."

By George Woods.

In this communication, the author refers to the experiments

of Mr. Henwood, published in the second volume of the Transactions, and to the result there stated, that the curve traced by the pencil of the indicator during the expansion of the steam, deviates from a true parabola, according to the temperature of the medium contained in the jacket. Mr. Woods comes to the conclusion that, the temperature remaining constant, the curve will deviate very considerably from a true parabola. The results obtained by the author, as to the relative powers of the engine before and after the steam is cut off, and the mean pressure as given by the indicator diagram, do not differ materially from those given by Mr. Henwood. But Mr. Woods differs from Mr. Henwood as to that portion of the curve which the latter selects as representing the true value of expansive working.

"Description of a Running Gauge for ascertaining the Parallelism of a Railway."
By Edward Cowper.

The construction of this guage somewhat resembles that of a truck, having two grooved wheels made to fit the rails on which it travels. It has two axles, one of them fixed and the other moveable, so as to accommodate itself to any variation in the width between the rails: to the end of the moveable axle is attached an arm, which, by its vibration across a dial, points out the degree of irregularity in the parallelism of the lines of rails. It can be used by hand, or attached to the end of a train of carriages, and is intended as a rapid mode of detecting any irregularity in the railway.

"An Azimuth Cap as an addition to the common Level."
By Edward Cowper.

It is sometimes desirable in levelling operations to ascertain the bearing of objects which are either above or below the field of view of the telescope. The common level alone cannot take

the bearing of such objects; for, by elevating or depressing the telescope, the action of the compass is destroyed; but, by slipping the Azimuth Cap on to the end of the telescope of the level, objects 50° above or below the field of view may be observed without disturbing the compass or altering the level of the telescope.

This instrument consists of a brass cap, containing two slips of looking glass, placed at an angle to each other, precisely as in Hadley's quadrant; one glass being fixed at an angle to the axis of the telescope, and the other being moveable about a centre. When any object is required to be brought within the field of view, the cap is placed on the end of the telescope, and the angle of the moveable glass is varied until the object is reflected on the fixed glass, and thence to the eye.

March 10, 1840.

The President in the Chair.

"A mode of bending Discs of Silvered Plate Glass into concave or convex Mirrors, by means of the Pressure of the Atmosphere." By James Nasmyth.

The difficulty of obtaining large specula for telescopes, together with the disadvantages attending the weight, the brittleness, and liability to oxidation, of the speculum metal generally used, induced Mr. Nasmyth to turn his attention to the employment of silvered plate glass for telescopic purposes, as it possesses perfect truth of surface, is lighter than metal, is not liable to oxidation, and a greater quantity of light is reflected from it than from any metallic surface.

To give a concave or convex form to a disc of plate glass, a certain pressure must be made to act equally over the surface. This equal pressure is obtained on Mr. Nasmyth's plan, by taking advantage of the weight of the atmosphere.

A disc of silvered plate glass, 39 inches in diameter and $\frac{3}{16}$ths of an inch in thickness, is fitted and cemented into a shallow cast-iron dish, turned true on its face, so as to render the cham-

ber behind the glass perfectly air tight; by means of a tube communicating with this chamber, any portion of air can be withdrawn or injected.

To produce a concave mirror, so slight a power is required, that on applying the mouth to the tube and exhausting the chamber, the weight of the atmosphere, which amounts in this case to 3558 lbs., acting with equal pressure over a surface of 1186 square inches, causes the glass to assume a concavity of nearly three-quarters of an inch, which, in a diameter of 39 inches, is far beyond what would ever be required for telescopic purposes. On re-admitting the air, the glass immediately recovers its plane surface, and on forcing in air with the power of the lungs, it assumes a degree of convexity nearly equal to its former concavity. The degree of concavity or convexity may be regulated to the greatest nicety, and it is proposed to render the degree of concavity constant, by placing in the air-tight chamber a disc of iron, turned to the required form, and allowing the pressure of the atmosphere to retain the glass in the form given to it by its close contact with the iron disc.

The curve naturally taken by the glass when under the pressure of the atmosphere, is believed by Mr. Nasmyth to be the catenary, inasmuch as its section would be the same as that of a line suspended from each end, and loaded equally throughout its length.

Mr. Lowe did not feel well assured that the curve naturally taken by the " Pneumatic Mirror," was the catenarian, as the plate being set in a frame, was supported all round its periphery, and resembled an arch resting on its abutments. He suggested the propriety of attempting to attain given curves by grinding the plate of different thicknesses in parts, so that the pressure of the atmosphere should affect it unequally.

Mr. Macneill was inclined to believe the curve assumed was the " Elastic Curve,"—the properties of which were examined by James Bernouilli, in the Memoirs of the Academy of Science, 1703.

List of Patents

Granted by the French Government from the 1st of July to the 31st of October, 1839.

PATENTS FOR FIFTEEN YEARS.

To Pickstone Dobrée, of Guernsey, represented in Paris by M. Perpigna, advocate of the French and Foreign Office for Patents, Rue Choiseul, No. 2, ter: for conversion of alternate rectilinear motion into rotary motion.

Baron de Suarce, of London, represented in Paris by M. Perpigna, advocate, for extraction of coloring matter and essential oils.

James Perry and Co., of London, represented in Paris by M. Perpigna, advocate, for improved ink-stands and apparatus for sealing letters.

Clavière, represented in Paris by M. Perpigna, advocate, for improved generators.

Romagny, junr., of Rheims, (Marne,) represented in Paris by M. Perpigna, advocate, for an improved Jacquard frame.

Arrowsmith, of London, represented in Paris by M. Perpigna, advocate, for new combinations in the system of steam-engines.

Beaumont, of York, represented in Paris by M. Perpigna, advocate, for an improved apparatus for making leaden pipes, and coating the same with another metal.

Davies, of Manchester, represented in Paris by M. Perpigna, advocate, for an improved machine for combing, carding, and spinning fibrous materials.

Fourneyron, represented in Paris by M. Perpigna, advocate, for improvements in machines for carding, combing, and spinning cotton and other fibrous materials.

Peugeot Brothers, of Hérimoncourt, (Doubs,) represented in Paris by M. Perpigna, advocate, for manufacturing saw blades.

Lucas Richardière, of Rennes, (Ille et Vilaine,) represented in Paris by M. Perpigna, advocate, for an application of the ebb and flow of the sea to hydraulic turbines.

Colson, of Clermont Ferrand, (Puy de Dôme,) represented in

Paris by M. Perpigna, advocate, for an alloy for casting printing type.

Passot, of Paris, for a new method of converting to useful purposes the pressure of fluids.

Réallier Brépols, of St. Péray, and Desfossis, of Brussels, for a fusible alloy to be applied by means of heat.

Carletti, of Paris, for jointed levers, applicable to carriages, steam-engines, &c.

Maille, of Villeneuve le Roi, (Yonne,) for ovens for burning lime and baking bricks.

Houdinot, of Paris, for carriages warranted not to upset.

Marchal, of Gondrecourt, (Meuse,) for fabrication of horse-shoes.

Perrot, of Rouen, (Seine Inférieure,) for a machine for printing tissues, papers, &c.

Beslay, of Paris, for a steam generator.

Charpentier, of Neuilly, (Seine,) for drying and preserving vegetables.

Parry, of Paris, for motive power, to be set in action by wind.

Reallier Brépols, of St. Péray, and Desfossis, of Brussels, for a process for drawing out glass.

Heerts, of Paris, for a machine for making tiles.

Audineau, of Bordeaux, for a machine for purifying wheat.

Fastier, of Paris, for a system of preserving alimentary substances.

Benôit Brothers and Vergues, of Montpellier, for fulling, cleansing, and washing of wool.

Wood, of Middlesex, for manufacturing of carbonate of lead.

Soley, for an improved machine for making nails.

Wayte, of Barford, England, for improvements in steam-engines and generators, and evaporation of liquids.

Marochetti, of Paris, for an apparatus for baking plaster in powder.

Aynard Pinchon, Laurent, and Denuelle D'Héronville, of Paris, for a process fit to replace indigo.

Goin, of Paris, for a mechanical cork.

Despréaux, of Courbevoie, for a new kind of stuff in imitation of the brocaded tissues woven on the Jacquard system.

Demay, Morsaline, and Vignaux, of Paris, for improved shoes, which preserve the feet against cold and damp.

De Fresne, of Paris, for an atmospheric motive power.

Dupont and Dreyfus, of Chehery, (Ardennes,) for torrefaction of wood in forests.

Berend, of Liverpool, for a process of extracting soda from hydrochlorate of soda.

Florens, of Bordeaux, for a new system of navigation.

Feuillet, of Paris, for a machine for casting printing characters.

Barthélemy, of Paris for an economical method of developing heat.

Ajasson, of Paris, for a fabrication of plaster and revivification of old plaster.

Maurand, of Paris, for kitchen stoves.

Corbin de Boissières, of Cheminan, (Marne,) for an improved feeding apparatus, applicable to blast furnaces.

Stehelin de Bistchwiller, (Bas Rhin,) for means of preventing the leakage of tubes in steam-engines.

Caplain, senr., of the Petit Couronne, (Seine Inférieure,) for an improved shearing machine.

De Bathen, of Montmartre, (Seine,) for two systems of rail roads.

Guillon and Humbert, of Paris, for improvements in the construction of doors and windows.

Durand de Monestrel, of Brignolles, (Var,) for an apparatus for softening leather.

Patin, of Paris, for making artificial leaves.

Low, of Paris, for a machine for making screws, pins, rivets, &c.

Bertin, of Bordeaux, for a method of whitening sugar in the forms.

Camus and Havard, of Paris, for dessiccation of watery matters.

Chartron, of Paris, for a process for heating.

Bourg, of Bercy, (Seine,) for improved water closets.

Charrière, of Paris, for surgical instruments made of caoutchouc.

Cerdias, of Reichshoffen, (Bas Rhin,) for an improved construction of turbines.

Guyot, of Paris, for a new method of lighting up the streets.

Vandermeulen, of Gand, for a process for evaporating liquids, and particularly alkaline solutions.

Trollope, of London, for improvements in rail-roads and locomotive engines.

Okey, of Paris, for improvements in the production of motive power.

Wagner, of Montmartre, (Seine,) for mechanical combinations, applicable to public clocks.

Pouch Lafarge, of Glandier, for a new method of fabricating iron, and economising time and fuel.

Dupont Brothers, of Paris, for a new process of re-printing, called lithotypography.

De Pastro, of Paris, for a machine for directing balloons.

Boucher, of Paris, for improvements in the instruments used for cutting and stamping.

Roussel, of Paris, for an apparatus for deriving a power from the force of air.

Crespel-Delisse, of Arras, (pas de Calais,) for metallic cloth for extracting sugar from beetroot.

Farcot and Legris, of Paris, for a new way of employing fluids, gases, or liquids, as a motive power, or for heating.

Lavoipierre, of Paris, for a method of preventing friction in all machines.

Houssard, of Paris, for a new system for cleansing cess-pools.

PATENTS FOR TEN YEARS.

To Kale, of Newburg, United States of America, represented in Paris by M. Perpigna, advocate of the French and Foreign Office for Patents, 2 ter: Rue de Choiseul, for improvements in rotatory pumps.

Homberg, of Francfort, (on the Mein,) represented in Paris by M. Perpigna, advocate, for improvements in steam-engines.

Montandon, represented in Paris by M. Perpigna, advocate, for a machine for making rivets and wire nails.

Hoheberger, of Burgau, (Bavaria,) represented in Paris by M. Perpigna, advocate, for improvements in the towing of steam boats.

Davies, of Manchester, represented in Paris by M. Perpigna, advocate, for a method of consuming smoke and economising fuel in forges, steam-engines, &c.

Humphreys, of London, represented in Paris by M. Perpigna, advocate, for a gas regulator.

De Fontenay, of Meurthe, represented in Paris by M. Perpigna, advocate, for a system of ventilating glass houses and potteries.

Constant Peugnot, of Andencourt, (Doubs,) represented in Paris by M. Perpigna, advocate, for certain improvements in spinning machines.

Foussat Brothers, of Bordeaux, represented in Paris by M. Perpigna, advocate, for a machine for cleansing and pearling rice.

Golay, Father and Son, of Lyons, represented in Paris by M. Perpigna, advocate, for improved trusses.

Pearson, of St. Pierre les Calais, for improvements in stocking frames.

Chavoutier, of Paris, for an apparatus for the transmission of heat.

Woodheat, of London, for a new method of preserving certain animal and vegetable substances.

Whyte, of London, for improvements in roads.

Poole, of London, for improvements in steam-engines.

Poole, of London, for a machine for making cards.

Benson, of London, for an improved apparatus for condensing steam.

Seaward, of London, for improvements in marine steam-engines.

Guérard, of Paris, for a machine for excavating earth.

Okey, of Paris, for improvements in the manufacturing of beet-root sugar.

Violette, of Brest, for an improved ruler, called lineagraph.

Duvoir and Co., of Paris, for an improved calefyer.

Buros, of Nantes, for a revolving axle applied to carriages.

Lavanchy, of Paris, for an apparatus for taking baths, &c.

Maréchal, of Bordeaux, for a mechanical axle, and improved boxes for wheels.

Bertrand and Feydeau, of Nantes, for vases to receive alimentary substances.

Liéven, of Paris, for a process for making bread without leaven.

Truffaut, of Paris, for a machine for turning round articles.

Charpentier, of Paris, for an improved extraction of sugar from beetroot.

Constant, of Bordeaux, for improved axles, applicable to three wheels.

Delarothière, of Troyes, for web, elastic in one direction only.

Neuburger, of Paris, for clock-works, going for three months together.

Rousseau, of Paris, for manufacturing of sulphuric acid.

Davoust and Léveque, of Alençon, for primers for percussion guns.

Dalmont, of Paris, for an apparatus for dividing solid from liquid matters before their arrival in their recipient, and disinfecting the same by means of ashes, &c.

Mudesse, of Paris, for veneering wood with marble.

Faublin de Banville, of Paris, for an inclining parasol.

De Mory, of Paris, for a new construction of windows, doors, and sashes.

Lamb, of London, for a composition and preparation of a new fuel.

Maillier, of Bordeaux, for an instrument for taking, mathematically, the form of the human fame.

Delménique, of Tibers, (Isère,) for baking bricks by means of raw anthracite.

Delarothière of Troyes, for a new kind of knitting.

Ardisson, of Belleville, for means of producing upon wood all that sculpture can produce.

Reboul, of Marseilles, for a composition of a soap, called grey soap.

Charrière, of Paris, for an improved pump for surgical purposes.

Caster and Co., for a beater for softening fibrous substances.

Poncet, of Lyons, for a new method of calligraphy.

Bertrand Ceoffroy, of St. Paul les Dax, for new rails in wood and iron, with appropriate waggons.

Bain, of Paris, for a water level.

Thibout de la Fresnaye, of Caen, and L'abbé, of Falaise, for impermeable tissues.

Leveillé, of Darnetal, for a machine for baking plaster with coal.

Rollet, of Marchiennes, (Nord,) for a construction of steam-engines.

De Amezago, of Pau, (Basses Pyrénées,) for a machine for increasing the power of engines.

Faullain de Banville, of Paris, for an inclining parasol.

Trutin, Bouvent, and Dumont, of Paris, for manufacturing of shawls without a wrong side

Charbonnier, of Paris, for improved fastenings for windows, called "Crémone."

Tyrell, of Paris, for a fabrication of white lead

Turner, of Paris, for an evaporating apparatus.

Artaud, of Marseilles, for a portable bed.

Bex, of Paris, for a new stucco.

Berthin, of Barbonne, (Marne,) for a means of spreading and unspreading the sails of wind-mills.

Pastel, of Villers-Bretonneaux, (Somme,) for hydraulic power.

Zugenbuhler, of Paris, for a geographical map.

Vicaillat,of Dole,(Jura,) for a machine for chopping suet and meat.

Vignier, of Vincennes, (Seine,) for a power applicable to mills.

Chardon, of Maubeuge, for improvements in the fabrication of coke.

Critchley, of Manchester, for a rotary steam-engine.

Frèrejean, of Lyons, for reverberating ovens for the manufacturing of iron.

Jacquemin, of Rheims, (Marne,) for a weaving frame.

Morin, of Montancy, (Ain,) for a frame for spinning, twisting, winding, and milling silk, by one operation.

Pinchbeck, of Lille, for new combinations adapted to steam-engines.

Accarier and Dufournel, of Arc, (Haute Saône,) for an economical stove in cast-iron.

Passet, of Montpellier, (Hérault,) for a continuous pasteboard.

Louvrier, of Pontarlier, (Doubs,) for an apparatus for straightening deformed limbs.

Reymond-Bertaut, of Paris, for watches, which are wound without being opened, and without the use of a key.

Escange, of Vinc, (Pyrenées Orientales,) for an improved manufacture of iron.

Dias, of Bordeaux, for a new process for making passover bread.

Fessarol, of Rouen, for mechanism applicable to weaving frames.

List of Patents

Granted for Scotland between the 22d July and 22d August, 1840.

To Christopher Nickels, of the York-road, Lambeth, (communicated from abroad,) for improvements in the manufacture of braids and plats.—Sealed 23rd July.

William Palmer, of Sutton-street, Clerkenwell, candle maker, for improvements in the manufacture of candles, and in apparatus for applying light.—Sealed 23rd July.

To Daniel Gooch, of Paddington Green, in the County of Middlesex, for improvements in wheels and locomotive engines, to be used on railways.—Sealed 24th July.

To Henry Dircks, of Liverpool, engineer, for certain improvements in the construction of locomotive steam-engines, and in wheels to be used on rail and other ways, parts of which improvements are applicable to steam-engines generally.—Sealed 24th July.

To Joseph Tunnicliff, of Charles-street, City-road, London, for certain improvements in the machinery or process for the reduction or comminution of dye woods, for facilitating the extraction of their colouring matter.—Sealed 27th July.

Renewal.—John George Bodmer, of Manchester, engineer,—for seven years,—for certain improvements in the machinery for cleaning, carding, roving, and spinning of cotton and wool.—Sealed 27th July.

Richard Smith and Richard Hacking, both of Bury, machine makers, for certain improvements in machinery or apparatus for spinning cotton and other fibrous substances.—Sealed 28th July.

Richard Smith and Richard Hacking, both of Bury, machine makers, for certain improvements in machinery or apparatus for drawing, slubbing, roving, and spinning cotton, wool, flax, silk, and other fibrous substances.—Sealed 30th July.

John Aitcheson, of Glasgow, at present of 144, Minories, London, merchant,—and Archibald Hastie, of West-street, Finsbury-square, merchant,—for certain improvements in generating and condensing, heating, cooling, and evaporating fluids.—Sealed 31st July.

Richard Beard, of Egremont-place, New-road, London, (communicated from abroad,) for improvements in apparatus for obtaining likenesses and representations of nature, and of drawing, and other objects.—Sealed 4th August.

Richard Hodgson, of Salisbury-street, Strand, London, (communicated from abroad,) for improvements in the forms or shapes of materials and substances used for building and paving, and in their combinations for such purposes.—Sealed 4th August.

John Rapson, of Park-street, Park-place, Limehouse, Middlesex, engineer, for improvements in steering ships and vessels.—Sealed 4th August.

Thomas Oram, of Lewisham, for improvements in the manufacture of fuel.—Sealed 4th August.

Samuel Lawson, of Leeds, and John Lawson of the same place, engineers, (communicated from abroad,) for improvements in machinery for spinning, doubling, and twisting flax, hemp, wool, silk, cotton, and other fibrous substances.—Sealed 6th August.

George Clarke, of Manchester, manufacturer, for certain improvements in the construction of looms for weaving.—Sealed 6th August.

Robert Thomson, of Mayfield Print Works, in Manchester, calico printer, for an improved method of block printing on

woven fabrics, of cotton, linen, silk, or woollen, or of any two or more of them, intermixed with improved machinery, apparatus, and implements, for that purpose.—Sealed 13th August.

Colin Macrae, of Cornhill, Perthshire, (communicated from abroad) for improvements in rotatory engines, worked by steam, smoke, gases, or heated air, and in the mode of applying such engines to useful purposes.—Sealed 13th August.

Downes Edwards, of Surbiton Hill, Kingston, Surrey, for improvements in preserving potatoes and other vegetable substances.—Sealed 13th August.

William Crane Wilkins and Matthew Samuel Kendrick, of Long Acre, London, lamp manufacturers, for certain improvements in lighting, and in lamps.—Sealed 13th August.

Charles Wheatstone, of Conduit-street, London, and William Fothergill Cooke, of Copthall-buildings, London, for improvements in giving signals, and sounding alarums, at distant places, by means of electric currents.—Sealed 21st August.

New Patents
SEALED IN ENGLAND.
1840.

To John Louis Bachelard, of Saint Martin's-lane, gentleman, for improvements in the manufacture of beds, mattrasses, chairs, sofas, cushions, pads, and other articles of a similar nature,—being a communication.—Sealed 30th July —6 months for inrolment.

Felix Tronbat, of Mark-lane, merchant, for improvements in the manufacture of vinegar.—Sealed 1st August— 6 months for inrolment.

William Daubney Holmes, of Lambeth-square, civil engineer, for certain improvements in steam-engines, and

in generating and applying steam as motive power.—Sealed 1st August—6 months for inrolment.

Thomas Barnabas Daft, of Birmingham, gentleman, for improvements in ink-stands or ink-holders.—Sealed 1st August—6 months for inrolment.

James Taaffe, of Shaw-street, Dublin, builder, for improvements in roofing and slating houses and other buildings.—Sealed 1st August—6 months for inrolment.

James Hodgson, of Liverpool, engineer, for a new mode of combining and applying machinery for the purpose of cutting and planing wood, so as to produce plane or moulded surfaces.—Sealed 3rd August—6 months for inrolment.

John Sanders and William Williams, of Bedford, iron-founders, and Samuel Laurence Taylor, of Old Warden, Bedford, machine maker, for improvements in ploughs.—Sealed 3rd August—6 months for inrolment.

George Edward Noon, of High Holborn, engineer, for improvements in pumps, and in engines for drawing beer, cyder, and other fluids.—Sealed 3rd August—6 months for inrolment.

William Saunders, of China-terrace, Lambeth, Chemist, for certain improvements in paving streets, roads, and ways. —Sealed 3rd August—6 months for inrolment.

William Beetson, of Brick-lane, Old-street, brass-founder, for improvements in water closets and stuffing boxes, applicable to pumps and cocks.—Sealed 5th August—6 months for inrolment.

Colin Macrae, of Cornhill, Perthshire, gentleman, for improvements in rotary engines, worked by steam, smoke, gases, or heated air; and in the mode of applying such engines to useful purposes,—being a communication.—Sealed 5th August—6 months for inrolment.

Theophilus Richards, of Birmingham, merchant, for certain improvements in cutting or sawing wood,—being a communication.—Sealed 5th August—6 months for inrolment.

Henry Trewhitt, of Newcastle-on-Tyne, Northumberland, Esq., for improvements in applying the power of steam-engines to paddle shafts used in propelling vessels,—being a communication.—Sealed 7th August—6 months for inrolment.

Robert Stirling Newall, of Dundee, gentleman, for improvements in wire ropes, and in machinery for making such ropes,—being partly a communication.—Sealed 7th August—6 months for inrolment.

Andrew Smith, of Princes-street, Leicester-square, engineer, for certain improvements in carriage wheels, rails, and chairs for railways.—Sealed 7th August—6 months for inrolment.

Thomas John Davis, of 5, Bloomsbury-square, Esq., for certain improvements in the form and combination of blocks of such materials as are now used, or hereafter may be used, in building, or for paving public and private roads and court yards, or public and private causeways, and subways, or any other purposes to which the said form and combination of blocks may be applied.—Sealed 8th August—6 months for inrolment.

Downes Edwards, of Surbiton Hill, Kingston, farmer, for improvements in preserving potatoes and other vegetable substances.—Sealed 8th August—6 months for inrolment.

John Isaac Hawkins, of College-place, Camden Town, civil engineer, for an improvement or improvements in buttons, and in the modes of affixing them to clothes,—being a communication.—Sealed 8th August—6 months for inrolment.

Francis William Gerish, of East-road, City-road, ironmonger, for improvements in apparatus to be used as a fire escape; also applicable to other purposes where ladders are used.—Sealed 8th August—6 months for inrolment.

Samuel Howard, of Manchester, engineer, for certain improvements in boilers and furnaces.—Sealed 8th August—2 months for inrolment.

Baron Charles Wetterstedt, of Limehouse, for improvements in preserving vegetable, animal, and other substances, from ignition and decay.—Sealed 11th August—6 months for inrolment.

John Peter Isaie Poncy, of Wells-street, Oxford-street, watch dealer, for improvements in clocks and chronometers,—being a communication.—Sealed 13th August—6 months for inrolment.

Miles Berry, of the Office for Patents, 66, Chancery-lane, patent agent, for certain improvements in the arrangement, construction, and mode of applying certain apparatus for propelling ships and other vessels,—being a communication.—Sealed 14th August—6 months for inrolment.

Pierre Armand Le Comte de Fontainemoreau, of Skinners-place, Size-lane, London, gentleman, for certain improvements in covering and coating metals and alloys of metals.—Sealed 15th August—6 months for inrolment.

John Young, of Wolverhampton, iron-master, for improvements in the manufacture or construction of knobs, handles, frames, tablets, boxes, and other ornamental articles, applicable to the decoration of houses and domestic furniture.—Sealed 17th August—6 months for inrolment.

Luke Hebert, of Birmingham, civil engineer, for certain improvements in the manufacture of needles.—Sealed 17th August—6 months for inrolment.

Joseph Lockett, of Manchester, engineer, for certain improvements in manufacturing, preparing, and engraving cylinders, rollers, or other surfaces, for printing or embossing calicoes or other fabrics.—Sealed 27th August—6 months for inrolment.

Charles Smith, of Exeter, builder, for improvements in the manufacture of lime and cements, or composition.—Sealed 27th August—6 months for inrolment.

William Church, of Birmingham, civil engineer, for improvements in fastenings applicable to wearing apparel, and in apparatus for making the same and like articles; and also in the method or methods of preparing the said articles for sale.—Sealed 27th August—6 months for inrolment.

Hugh Unsworth, of Blackwood, Lancaster, bleacher, for certain improvements in machinery or apparatus for mangling, drying, damping, and finishing woven goods or fabrics. —Sealed 27th August—6 months for inrolment.

Thomas Robinson Williams, of Cheapside, gentleman, for certain improvements in measuring the velocities with which ships or other vessels, or bodies, move in fluids; and also for ascertaining the velocities of fluids in motion.—Sealed 27th August—6 months for inrolment.

Benjamin Hick, junior, of Bolton-le-Moors, Lancaster, engineer, for certain improvements in regulators or governors for regulating or adjusting the speed or rotary motion of steam-engines, water wheels, and other machinery.—Sealed 27th August—6 months for inrolment.

Henry Waterton, of Fulmer-place, Gerard's Cross, Buckingham, Esq., for improvements in the manufacture of sal ammoniac.—Sealed 27th August—6 months for inrolment.

CELESTIAL PHENOMENA FOR SEPTEMBER, 1840.

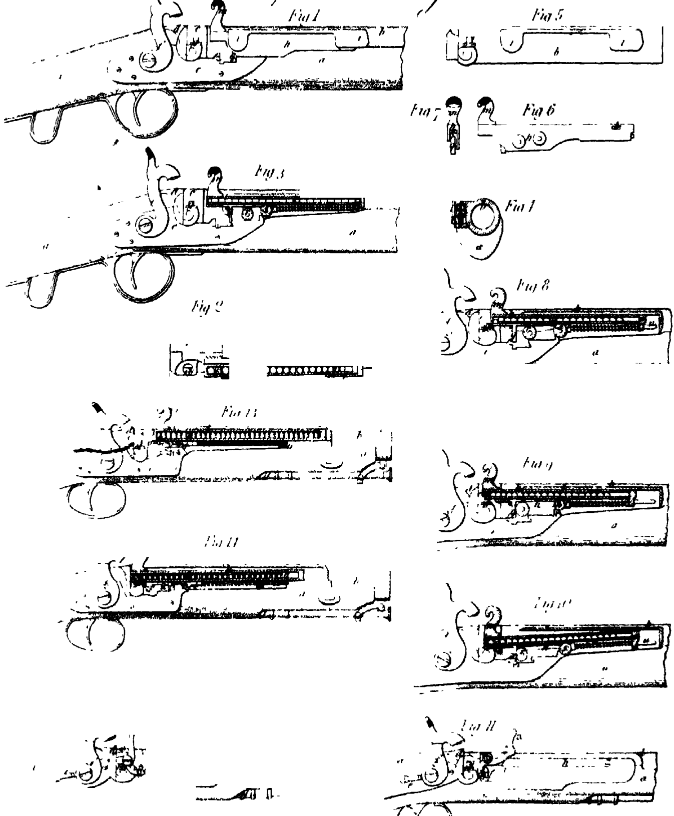
D. H. M.
1 6 37 ♃ in conj. with the ☽ diff. of dec. 6. 19. N.
— Clock after the sun, 0m. 14s.
— ☽ rises 11h. 42m. M.
— ☽ passes mer. 3h. 56m. A.
— ☽ sets 8h. 2m. A.
3 10 38 ☽ in □ or first quarter.
— Occul τ in Scorpii. im. 5h. 23m. em 6h. 47m..
19 54 ♄ in conj. with the ☽ diff. of dec. 6. 20. N.
4 2 0 ☽ in Appogee
5 Clock after the sun, 1m. 32s.
— ☽ rises 3h. 59m. A.
— ☽ passes mer. 7h. 16m. A.
— ☽ sets 10h. 36m. A.
9 36 Ceres stationary
13 3 ☿ in Perihelion
7 13 47 ♄ in □ with the ☉
10 Clock after the sun, 3m. 13s.
— ☽ rises 5h. 55m. A.
— ☽ passes mer. 11h. 16m. A.
— ☽ sets 3h. 32m. M.
15 Her: in oppo. to the ☉
11 7 48 Ecliptic oppo. or ○ full moon
8 42 Her: in conj. with the ☽ diff. of dec. 3. 2. S.
15 Clock after the sun, 4h. 59m.
— ☽ rises 7h. 9m. A.
— ☽ passes mer. 2h. 25m. M.
— ☽ sets 10h. 22m. M.
— Occul ε in Arietes im. 9h. 46m. em. 10h. 32m.
21 2 ☿ greatest hel. lat. N.
16 20 ☽ in Perigee.
17 Mercury R. A. 11h. 13m. dec. 6. 59. N.
Venus R.A. 12h. 36m. dec. 2. 45. N.
Mars R.A. 9h. 14m. dec. 17. 17. N
Vesta R. A. 16h. 36m. dec. 21. 19. S.
Juno R. A. 10h. 1m. dec. 6. 49. N
Pallas R. A. 18h. 20m. dec. 10. 12. N.

D. H. M.
— Ceres R. A. 19h. 23m. dec. 31. 30. S.
— Jupiter R. A. 14h. 55m. dec. 15. 51. S.
— Saturn R. A. 16h. 58m. dec. 21. 27. S.
— Georg. R. A. 23h. 17m. dec. 5. 26. S.
— Mercury passes mer. 23h. 30m.
— Venus passes mer. 0h. 50m.
— Mars passes mer. 21h. 26m.
— Jupiter passes mer. 3h. 8m.
— Saturn passes mer. 5h. 12m.
— Georg. passes mer. 11h. 30m.
18 5 32 ☽ in □ or last quarter
19 Occul A Geminorum, im. 15h. 22m. em. 16h. 29m.
20 Clock after the [illegible]. 44s.
— ☽ rises, 11h. 56m. A.
— ☽ passes mer. 7h. 24m. M.
— ☽ sets 3h. 59m. M.
22 0 28 ♂ in conj. with the ☽ diff. of dec. 0. 31. N.
11 53 ☉ enters Libra, Autumn commences
25 Clock after the sun, 8m. 27s.
— ☽ rises 5h. 29m. M.
— ☽ passes mer. 11h. 34m. M.
— ☽ sets 5h. 24m. A.
6 27 Ecliptic conj. or ● new moon
8 41 ☿ in conj. with the ☽ diff of dec. 4. 57. N.
26 9 16 ☿ in sup. conj. with the ☉
21 26 ♀ in conj. with the ☽ diff. of dec. 5. 28. N
28 23 55 ♃ in conj. with the ☽ diff. of dec. 6. 10. N.
30 Clock after the sun, 10m. 6s.
— ☽ rises 11h. 49m. M.
— ☽ passes mer. 3h. 25m. A.
— ☽ sets 6h. 56m. A.
8 20 Pallas in □ with the ☉

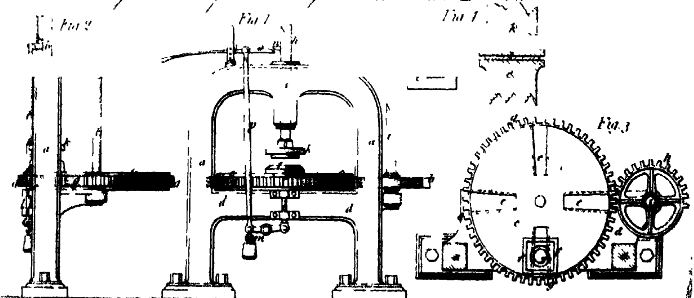
There are none of the Eclipses of Jupiter's Satellites visible at Greenwich this month.

J. LEWTHWAITE, Rotherhithe.

Richards: Improvements in Guns &c

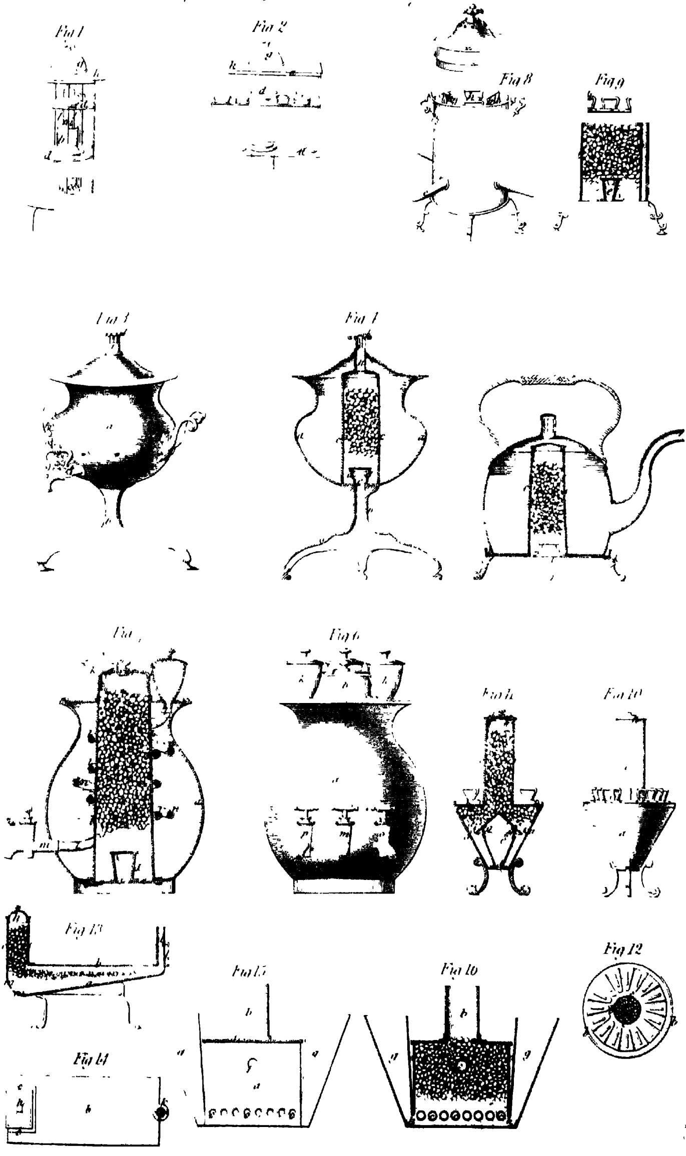


Yates &c for making Earthenware Filters

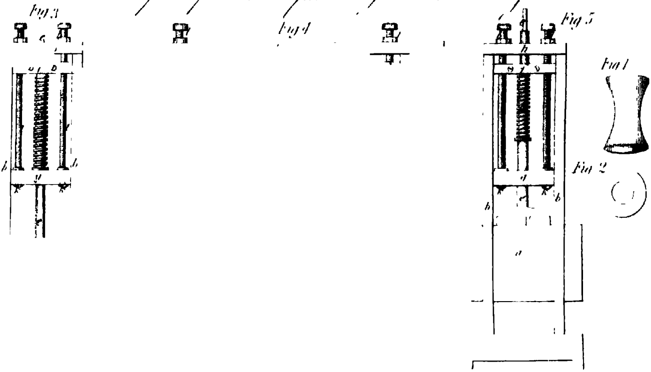


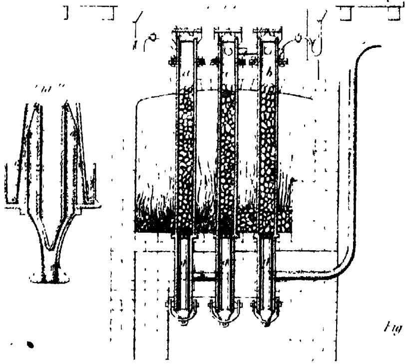
T. Sharratt Lithog.

Joyce's Impt. in Culinary Utensils

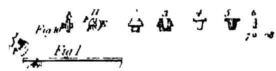


Berry's Impt in manufacturing Metallic Tips

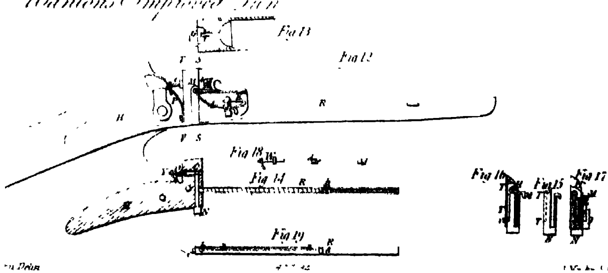




Napier's Improved
Iron Steam Boat



Manton's Improved Gun



THE

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CONJOINED SERIES.

No. CV.

Recent Patents.

To William Westley Richards, *of Birmingham, in the county of Warwick, gun maker, for his invention of an improved primer for fire-arms.*—[Sealed 2nd March, 1838.]

My invention of an improved primer for fire-arms, consists of a novel construction and arrangement of apparatus, or magazine and primer, to be attached to muskets, carbines, pistols, fowling pieces, and other fire-arms, for the purpose of depositing the priming (as copper percussion caps, &c.) on to the nipple or touch-hole of the piece; such apparatus being constructed to hold a proper quantity of copper percussion caps, or other priming, for a given number of charges, and is capable of being easily and readily brought forward over the nipple of the piece, and depressed thereon, so as to cause a cap or priming to be deposited and left

upon the nipple or touch-hole,—the magazine or primer returning to its original situation, of its own accord, immediately it is released from the hand of the person using the fire-arms. All of which will be better understood by reference to the accompanying drawings, which are representations of a portion of a carbine or musket, and pistols, with my improved magazine-primer adapted thereto; the several figures shewing the improved primer when in a state of rest, and in the various positions it is brought into when the priming of the piece is effected.

Fig. 1, Plate V., is a partial side view of a carbine or musket, with my improved primer applied thereto in one modification of construction and adaptation; fig. 2, is a longitudinal section, taken horizontally, to shew the interior of the magazine-primer; fig. 3, is a similar section, taken vertically; fig. 4, is a cross section, taken through the primer, barrel, and stock; fig. 5, is a partial representation of the barrel detached from the piece, shewing the parts by which the primer is secured in its proper place to the barrel, and protected thereby; fig. 6, is a side representation of the primer, detached from the barrel; and fig. 7, is a front end view of the same.

Figs. 8, 9, and 10, are sections of the carbine, shewing the interior of the same, with the primer, in the different positions it is brought into by the thumb of the right-hand, in the act of priming; similar letters of reference being marked upon corresponding parts in all the figures.

a, is the stock; *b*, the barrel; *c*, the breeching; *d*, the false breech; *e*, the lock-plate; *f*, the hammer; *g*, the nipple; all of which are constructed in the ordinary manner, excepting the lock-plate, which, in this instance, is adapted to receive and act in conjunction with my improved magazine-primer *h*, *h*. The primer is secured to the barrel by the shield *i*, *i*;—these parts, in this mode of

affixing it, being welded or soldered to the barrel. But the shield may be formed, independent thereof, and secured to the lock-plate or stock in any convenient manner, though I prefer attaching the shield to the barrel, as it is a stronger method of securing it, and better adapted to protect the primer from injury, by blows from a sword, &c.

The magazine of the primer is a hollow tube *h, h,* the sides of which project down to cover the other parts or mechanism; it is shewn in the drawings as made of brass, but it may be constructed of other metal. Into this tube the copper caps *k, k,* are placed, either singly by hand, through the aperture *l,* which is closed, when the primer is at rest, by the shield *i*; or they may be introduced at the end of the primer by emptying them from a tube or larger magazine; or it may be filled in any other convenient manner. *m,* is the thumb-piece, by which the primer is drawn towards the nipple, and depressed upon it when in the act of priming. The exit aperture for the copper caps, &c. is at *n,* it being closed by the sliding shutter *o,* at all times, excepting when it is brought immediately over the nipple or touch-hole. The sliding shutter *o,* is attached to the piece *p,* having the tail-piece *q,* projecting therefrom; this piece *p,* slides between the sides of the primer. *r,* is an anti-friction roller, turning on an axle placed in the primer; *s,* is another roller, having its axle in the end-piece *t,* of the rod *u.*—These rollers are used to render the movements and action more easy, but they may be dispensed with, as they are not positively necessary. *v,* is a compressed helical spring, placed on the rod *u,* having its abutments against the pieces *t,* and *w,* and by its expansive force, returns the primer into its position of rest after the priming has been effected,—the primer being kept up in its place by the spring, in conjunction with the inclined plane *x,* acting upon the roller *s,* as shewn in figs. 3, 8,

and 9. *y*, is a stud or pin placed on the side of the tube, and determines the position of the shutter, with the exit aperture; and *z*, is a stop-piece, on the lock-plate, to arrest the tail-piece *q*, and open the aperture.

The action and operation of the primer is as follows:—The person using the piece takes hold of the stock, precisely in the same way as when cocking the lock, the thumb of the right-hand being used in the same way upon the thumb-piece *m*, as if upon the cock or hammer. The primer is then brought forward, by the action of the thumb, into the position, shewn at fig. 9, that is, over the nipple; but, before it reaches this position, the tail-piece *q*, will have come against the stop *z*, and thereby be arrested, as shewn in fig. 8; the sliding shutter also remaining while the primer is drawn on, carrying the exit aperture from off the shutter and over the nipple, at which moment the primer is depressed, by the thumb, into the position shewn in fig. 10, thereby causing the nipple to enter the primer, and into the copper cap, at the end of the tube; the thumb is then to be quickly released, when the primer will instantly fly back into its quiescent position by the action of the spring, the copper cap being left on the nipple.

It will be seen, by inspecting the figures 9 and 10, that when the primer is drawn out to its full extent, the roller *r*, will have come against the tail-piece *q*, thus determining the length the primer shall be drawn out, so that it may always be drawn into the proper position over the nipple. And further, that the notch or recess, cut out of the lock-plate, and the inclined plane *x*, allow both of the anti-friction rollers and tail-piece *q*, to descend, when the primer is being depressed upon the nipple. But all these parts, shewn in the drawings as being formed upon the lock-plate, may be made in a separate piece, and attached to the fire-arms, if thought desirable. And, moreover,

these parts may be varied, and their position altered; and, in some instances, they may be dispensed with, as hereinafter set forth.

Having now particularly described the construction and adaptation of my improved magazine-primer, and one modification thereof, I would remark, that the same may be varied without departing from my invention; for instance,—the thumb-piece *m*, may be formed as a lever of the first order, its fulcrum being on the side of the tube, and its shorter end acting against an abutment-piece on the primer, as shewn in figs. 11 and 12, which are side representations of another modification of my improved magazine-primer, as adapted and applied to a pistol, the primer being shewn in different positions. *a*, is the thumb-piece or lever, having its fulcrum at *b*,—its shorter end *c*, acting against the abutment-piece *d*, which is placed on the end of a spring, and allows it to move with the primer when descending upon the nipple. It will be seen, that if this piece *d*, be properly shaped or formed, the primer may be made to descend upon the nipple by the action of the thumb in drawing the primer forward, without the direct pressing action of the thumb being required.

The other letters of reference are marked upon corresponding parts to those in the former figures, therefore no further description will be necessary.

Figs. 13 and 14, are representations of a pistol, with another modification of my invention, in which several parts, shewn in the former figures, are dispensed with, (viz.) the tail-piece *q*, the stop *s*, and the anti-friction roller *s*.

Fig. 13, is a sectional representation of the pistol, with the primer at rest; and fig. 14, is another section, shewing the primer in action.

In this modification the end of the sliding shutter *o*, comes against the nipple as its stop-piece, where it is

retained while the exit-aperture proceeds over the nipple. The primer is kept up by the inclined plane *x*, acting against the projecting part *t*, instead of the anti-friction roller *s*, as in the former instance;—and in this modification the roller *v*, is placed in the lock-plate instead of in the primer. The extent of motion of the primer, after the sliding shutter is arrested, is determined by the pin *y*, coming against the short tail-piece 1, on the sliding shutter, at which time the part 2, of the primer, will have passed from over the roller *v*, and part 3, of the lock-plate, when the primer is at liberty to descend upon the nipple, leaving the cap thereon; the nipple being, in this instance, sufficiently long to allow of the end of the sliding shutter passing down its side.

In order to remove the primer from the fire-arms, it is necessary, in these modifications, first, to take the barrel out of the stock, when the primer may be taken away.—But it may be attached to the piece, so that it can be readily removed without disturbing the barrel, if thought desirable, (viz.) by making the side holding pieces *i*, *i*, of the shield, to turn on a screw-pin, like "turn-buttons," capable of moving out of the way, and releasing the primer, and turning down into the position shewn in the drawings, to secure it.

It will be seen that, should my improved magazine-primer, from any cause, get out of order, or if it should be inconvenient immediately to re-fill it when exhausted, copper percussion caps, or other priming, may be applied to the locks by hand, in the usual manner, there being no inconvenience occasioned by the magazine-primer to priming by hand.

And, further I would remark, that other shaped springs than that shewn in the drawings may be used to return the primer. And also, that in order to ensure the proper

delivery of the caps on to the nipple, they should be made greater in diameter than in height, and the tube shaped accordingly, and adapted to receive them;—if this is properly attended to, the caps will slide freely down the tube without the chance of catching or stopping; the position of the piece, in the act of loading, always causing the caps to descend and come over the exit aperture, and therefore no spring is required in the tube or magazine to force the caps towards the exit aperture, which has hitherto been necessarily applied to copper-cap magazine-primers. And also, that other priming, than copper caps, may be used, my improved magazine-primer being adapted to receive it; for instance,—detonating pellets, or small pieces of tube filled with detonating powder, or the detonating powder itself may be applied, the nipple or touch-hole being constructed and adapted, accordingly, to receive and retain the priming of whatever description it may be.

And I would further remark, that although I have shewn my improved magazine-primer, as applied to single-barrelled fire-arms only, yet the same is equally applicable to double-barrelled pieces; and when they are so applied, they may be placed either on the top of the barrels, (the rib of the piece being made a little higher than usual,) or they may be applied at the sides thereof; and when this is the case, the nipple or touch-hole, for receiving the priming, must either be a fixture in the lock-plate, or fixed in projecting wing or side breeches, screwed into the breech of each barrel, so that the wing or side breech may be removed previous to unscrewing the breeching of the barrels to separate them; all of which will be easily suggested by any practical workman, and need not be described by me.

And, in conclusion, I would remark, that I do not claim any parts of the lock, in connection with my improved primer, nor do I confine myself to any one particular

modification thereof; but what I claim, as my invention, is the improved magazine-primer for fire-arms, as herein set forth and described, which is capable of being easily and readily drawn over the nipple or touch-hole, and depressed by the action of the thumb, for the purpose of depositing the priming thereon, and immediately returning to its quiescent position, away from the nipple, on the thumb being withdrawn; and which improved magazine-primer is protected from blows or injury by its casing or shield, and held up into its proper position, when out of action, by the force of its spring and inclined plane.—[*Inrolled in the Rolls Chapel Office, August*, 1838.]

To MILES BERRY, *of the Office for Patents*, 66, *Chancery-lane, in the county of Middlesex, patent agent and mechanical draftsman, for an invention of certain improvements in looms for producing metallic tissues, and also improvements in such tissues, applicable to the making of buttons, epaulettes, tassels, and other purposes, for which gold and silver lace or braiding is commonly employed, and to the making of imitations of jewellery and other fancy articles,—being a communication from a foreigner, residing abroad.*—[Sealed 30th August, 1838.]

THIS invention of certain improvements in looms for producing metallic tissues, and also improvements in such tissues, relates to the weaving or producing ornamental metallic tissues or fabrics of wire, applicable to various useful purposes, for which ordinary gold and silver lace is commonly used; as for instance,—in the making of different articles of ornamental dress, epaulettes, bands,

sashes, bindings, trimmings, tassels, buttons, and various other purposes where gold and silver lace is now applied; also to the covering of boxes, books, card-cases, and covering or forming various imitations of jewellery, and other fancy articles; and consists in weaving, making, or forming such ornamental metallic tissues, entirely of strands of wire, either of gold, silver, silver-gilt, copper-gilt, or other metal, or mixtures of metal, which wires are woven into a tissue or fabric, having patterns or ornamental devices thereon, by any suitable "engine" or "figuring loom;" such ornamental metallic tissues being composed entirely of metal, in contra-distinction to the ordinary gold and silver lace, and have all the variety of design or pattern, and brilliancy of appearance, of the finest figured or brocaded silk, or other fabric, without their perishable qualities; and are capable of being cleaned by boiling or washing with water, or immersing in acid solution, and gilded or silvered, or even soldered together after they have been woven,—which cannot be done with tissues having silk, cotton, or other threads, interwoven in the fabric.

The improvements in the looms for weaving such tissues or fabrics, being the application and adaptation of the well-known Jacquard mechanism or apparatus for acting upon the warp strands or wires, to produce the figure or design, together with suitable mechanism, whereby the same is made or rendered better applicable to the loom for this purpose; for when the Jacquard apparatus is applied in the ordinary manner, the abrupt or sudden action caused by the treadles through the Jacquard upon the warps, and also their great extent of opening or separating, to allow the shuttle to pass, is liable to break the metallic strands, they not being so elastic or capable of yielding longitudinally as warps of silk or twisted fibrous material; and

therefore, a means of remedying this evil is adapted with the Jacquard to the loom. The rising motion of the head-board or top of the Jacquard apparatus, being first met by an elastic resistance, and then stayed at the proper distance by an adjustable stop-piece.

I would here remark, that I am aware that solid gold and silver or gilt wire has been heretofore applied in the making of gold and silver lace; but it has only been used as weft threads interwoven with warps, consisting of threads of silk or fibrous material, such warps being covered, or nearly so, by the shoots of metal weft, and having a small or finer binding warp thread of silk or fibrous material to secure such metal weft in parts where it floats over several warps to produce the figure of the pattern or design on the face of the fabric; and such combination of metal, and silk or fibrous material, has heretofore only been woven in an ordinary figuring loom without the Jacquard apparatus; such lace has all the disadvantages of the common gold and silver lace, composed entirely of threads of silk or fibrous material, both warp and weft, covered by a thin coating of metal wound or coiled around them.

Also I would state that, a description of metallic tissue has heretofore been woven in ordinary looms of the simplest construction, that is, without the means of producing figures or designs; but this has been done only in broad pieces of plain fabric, the warp and weft regularly interweaving with one another at each shoot of weft or change of the sheds of warp, that is, one up and one down, without any design or ornamental pattern or figure; which woven *wire-work* or fabric is applicable to the making of window blinds, paper-strainers, sieves, screens, fire-guards, and other purposes, where the same may be used. Therefore, I wish it to be understood, that I do not intend to

claim, as this invention or improvements, the making or forming any fabric or tissue, in which wires or strands of metal are used, interwoven with threads of silk or fibrous material; neither the making of a broad plain tissue or fabric of wire, with the warp and weft regularly interwoven with each other at each change of warp, as in ordinary woven wire-work.

I will now proceed to describe how this invention is to be carried into effect; and, first, state the process of annealing the wire strands; then describe the improved application of the Jacquard and the apparatus connected therewith; and, finally, refer to the various applications of the metallic tissues so made, and how they may be joined together, and cleaned when required.

In order to apply this invention with good effect, and produce the ornamental tissues with the best advantage, the metallic strands or wire should be carefully annealed by heating the same, and allowing it to cool gradually, in order to destroy the brittleness caused in the drawing of the wire, and to render it as pliant as possible, so that the metallic strands may work well with the Jacquard apparatus; and this should be done without destroying its colour or brilliancy; and, therefore, the following means or method of effecting this object should be pursued:—

The wire is first wound upon hollow metal bobbins, shewn in figs. 1, and 2, (see Plate VII.,) which are side and end views of one of them. Into the hollow part or centre of these bobbins are to be placed red-hot pieces of metal, whereby the wire will be heated, and then allowed gradually to get cold. In order to preserve the polish of the wire, and not to injure its colour, the bobbins should be of different metals, according to the different metal wires to be operated upon; for instance, when copper wire

is to be used, the bobbin should be formed of copper; if the wire is silver or silver-gilt, or copper-gilt, the bobbin should be formed of silver, and they are recommended to be of the shape shewn in the drawing, as they have been found to answer well. But this process of annealing, as well as the means employed, may be varied according to circumstances, and the kind of metal to be operated upon; or the wire or metallic strands may be annealed in any other convenient way; but the above described process prevents the wire being injured by heat, and gives it all the pliancy desired.

The Jacquard mechanism for operating upon the warps, according to the figure or pattern desired to be formed upon the fabric, is so well known, that it will not be necessary for me particularly to describe the same, it forming no part of this invention; and the manner of applying it to a loom, for weaving fancy or figured goods in silk and other materials, is so well understood, that it will only be necessary for me to allude to its parts, and shew the mechanism by which it is rendered more applicable to the weaving of these ornamental metallic tissues.

The ordinary Jacquard mechanism, is composed of a fixed part, through which vertical wires ascend and descend, and a moveable top or head-board, which is raised or lifted up by the action of the lever and cord attached to the treadle of the loom. When the treadle is depressed, the cord is drawn down, and the head-board of the Jacquard raised, taking with it all the vertical wires that have not been displaced by the action of the pierced cards upon the horizontal wires of the Jacquard mechanism. It is to this moveable head-board of the Jacquard that the mechanism, represented in the drawings, is applied, for the purpose of regulating the opening of the warp threads by an elastic

or yielding resistance and adjustable stop-piece, instead of leaving them to the ordinary action of the treadle and Jacquard.

This mechanism may be placed at either or both ends of the head-board of the Jacquard, which is limited in its action by the stop-piece and adjustable set-screws.

Fig. 3, is an end elevation of the mechanism or elastic stop, shewing the head-board of the Jacquard when down, ready to bring up the vertical wires; fig. 4, is a face or side elevation of the same; and fig. 5, a similar representation to fig. 3, shewing the head-board of the Jacquard in the act of rising. *a*, represents the head-board or top of the Jacquard; *b*, *b*, part of the standards or frame-work of the Jacquard mechanism, forming guides, between which the head-board moves up and down; *c*, is a plate or block, bearing on the head-board, by means of the helical spring *d*. The block *c*, has a rod *e*, attached to it, surrounded by the open coiled or helical spring *d*, one end of which abuts on a collar, formed upon the rod, and the other against the piece *f*, attached to the standards *b*. The rod *e*, passes freely through the adjustable stop *g*, and also the part *f*, and the cross-piece *h*, of the standards. The stop-plate *g*, is held in the required position by the two adjustable screws *i*, *i*, passing through the pieces *f*, and *h*, the screws being attached to the stop-plate by screw-bolts *k*, *k*, covered with leather, or other elastic material, to deaden the blow of the head-board. The screws *i*, are furnished, at their other ends, with adjustable screws and nuts *l*, to regulate the position of the stop-piece *g*, and, consequently, the extent of motion of the head-board, and of the opening of the warps; for, whenever the heddle is depressed for this purpose, the helical spring *d*, yields gradually to the action of the head-board, by collapsing between its bearings, while the stop-piece *g*, being kept in

its proper situation by the screws *i*, receives the blow of the head-board, and stops it at the required time, the spring *d*, expanding again on the downward movement of the head-board.

Supposing the loom to be fitted with the Jacquard apparatus, and the elastic and adjustable stop, above described, and ready for operation, I will proceed to explain the manner of setting the loom to work.

First, begin by warping the annealed metallic strands or wires, by six at a time, on the ordinary "warping roller," each wire being supplied from a bobbin, placed on a creel in the same manner as in the ordinary method of warping cotton, silk, or other threads.

These metallic strands are to be fastened, by packs of 25 together, on the "warp roller" of the loom, taking care they are all equally distended. When this is done, the roller is to be turned round, and all the warp threads wound evenly thereon. It is requisite, at each revolution of the roller, to place a strip of card-board, or piece of stiff paper, or other material, upon the metallic strands, wound upon the roller, in order to prevent them from getting entangled one with the other; or a continuous sheet of card-board, paper, or cloth, may be wound on with the strands for this purpose. This precaution is very necessary, as otherwise the warps would bind one with another, and prevent them unwinding or drawing off regularly, and thereby become broken. A sufficient length of the metallic warps must be left unwound, to allow of their being passed through the headles and the reed;—this is done in the same way as with cotton or silk warps; the workman, however, must be careful not to let any of the strands escape, for, if he does so, the wire springing back would coil upon itself, and loop up into a kind of knot,—consequently be spoilt. When this is the case, the injured wire must be

replaced by another, to be taken from an extra spool or bobbin, placed at the back of the loom; and every time a metallic strand breaks, during the weaving of the tissue, it must be replaced by a fresh one, taken from an extra bobbin; and the part of the broken strand, remaining on the "warp roller," conducted out of the way by passing it over a small pulley, and kept, by means of a leaden weight attached to it, from intermixing with the other or perfect warps.

When all the warps are passed through the headles and the reed, they are to be collected, in packs of 25, and fastened to the "work roller," the strands being distended equally thereon.—These preliminary operations being performed, the loom is ready for working, and the weaving may begin.

The shuttle employed is similar to that used in the weaving of silk, and is supplied with a bobbin or spool, containing the metallic weft strands, which is to be replaced by a full bobbin, as the weft is used in the progress of weaving. The shuttle should, however, be rather heavy, as instead of governing the delivery of the weft, it would then be governed by it, and would spring back and cause injury to the work. The first few courses of the shuttle serve to regulate the position of the warps, as in ordinary weaving, and for that purpose string, or any kind of weft, may be used instead of metallic wires. The remainder of the operation of weaving is effected in precisely the same way as when working with silk or other materials; care should, however, be taken that the weft strands of wire should be finer than those of the warp.

Tissues, composed of copper wire, may be woven in their natural colour, and afterwards gilded or silvered; or this may be done previous to the weaving, as thought desirable.

Silver tissues require much less care in the course of

fabrication than wire, gilt or silvered, as with the latter, care must be taken not to injure the surface; the tissue, as it is woven, should be covered with a cloth.

Metallic galloon, bindings, or ribbons, are made, as above described, without changing either the preparation of the strands, or Jacquard, or mechanism; and the same observation applies to all such narrow goods.

Having now described the manner or method of carrying this invention into effect, I will proceed to make some remarks upon these ornamented metallic tissues and their application and uses.

These metallic tissues may be applied to a great variety of articles and purposes, and, by their being composed entirely of metal, may be cut into any number of parts or forms, and attached to each other, or to other metal pieces, by soldering, or by the usual mode of joining various articles of jewellery and fancy work. They may be used for the top parts and bindings of epaulettes, where common gold and silver lace is now employed; for covering the heads of tassels; covering buttons; and various fancy articles; and when woven in narrow breadths, after the manner of gold and silver lace, galloons, or binding, they may be used for hat and other bands, sashes, bindings, and trimmings for various purposes.

The metallic tissues, composed of silver wire, are very readily cleaned with a solution of water and sulphuric acid,—the strength or portion of acid is regulated according to the degree of oxidation of the metallic tissues; or they may be cleaned in any other way that delicate metal articles are usually cleaned. Those articles which have become discolored by exposure to the atmosphere, the effect of smoke, or other causes, may be dipped in acid solution, and their primitive freshness restored.

Having described this invention, and the manner of

carrying the same into effect, in conclusion, I would remark, that I claim, as the invention or improvements, secured to me under the above in part recited letters patent, in the improvements in looms for weaving ornamental metallic tissues, the application and adaptation of the Jacquard mechanism, or apparatus thereto, for the purpose of acting upon the metallic warps or strands of wire, and producing the design or pattern upon the face of the fabric, together with the elastic resistance and adjustable stop to regulate the action and the extent of motion of the said Jacquard mechanism, and the opening or separating of the sheds of metallic warp; and also I claim, the weaving, making, or manufacturing of ornamented metallic tissues entirely of wire, with designs, or figures, or patterns thereon, by any suitable "figuring loom;" and which tissues are applicable to the purposes for which ordinary gold and silver lace is commonly used; as well as for various other purposes to which such gold and silver lace is not applicable.—[*Inrolled in the Rolls Chapel Office, February,* 1839.]

Specification drawn by Messrs. Newton and Berry.

To THOMAS JOYCE, *of Camberwell New Road, in the county of Surrey, gardener, for his invention of certain improved modes of, and apparatus for, applying prepared fuel to various culinary and domestic purposes.*—[Sealed 15th March, 1838.]

MY present improvements consist in certain modes of, and apparatus for, applying the said prepared fuel to certain culinary and domestic purposes, not contemplated in any former patent, (viz.) *plate warmers,* or *chambers,* or

closets, to keep plates, dishes, and viands hot; ***tea and coffee urns, and kettles***, intended either to boil liquids, contained therein, or to keep them at a desired temperature; ***wine or beer warmers, or urns***, used for heating or warming such fluids; also, ***ironing stoves***, and other heating apparatus for laundry use, such as ***fluting*** or ***frilling irons***, and common flat irons; likewise hot-closets for airing and drying linen and other articles; and lastly, apparatus for heating the fluid contained in baths, coppers, and other vessels, to which the external application of fire would be inconvenient. All of which improved apparatus are susceptible of slight modifications;—I will, therefore, proceed to describe such arrangements as I have found to answer for the various applications and purposes for which they are intended, without confining myself to the precise forms thereof.

Plate VI., fig. 1, is an elevation of one construction of a cylindrical-shaped plate warmer, one of the doors being shewn open to expose the interior. *a, a,* is the outer casing of tin or plate metal, which may be encased or covered with wood to prevent radiation of heat, if thought desirable. It is supported on legs to allow access of air to the under part of the stove or chamber *b*, containing the fuel, or it may be supplied with air to support combustion from within the apparatus, through holes *c, c,* near its bottom. The interior of the plate warmer is furnished with two or three more shelves *d, d,* to receive plates, dishes, or viands, the bottom plate *e*, also serving for this purpose. The centre of the apparatus is occupied by the stove or fuel chamber *b*, which may be let into a recess or not, as thought desirable; and the inner edges of the shelves *d*, are supported by rods *f, f,* extending from the top to the bottom of the apparatus; *g*, is a cap-piece or cover applied to an aperture formed in the top-plate *b*, and

is pierced with small holes to allow the escape of hot air or vapour arising from the viands or the stove. Through the aperture in this plate the stove can be readily removed to be supplied with fuel, or to ignite the same when required.

The plate warmer has one or two doors *i*, according to the size of the apparatus, and handles *h*, by which it can be readily carried about. The stove, in which the fuel is consumed, is, in this instance, made portable, and can be readily drawn out of the apparatus by its handle *l*, it being supplied with air at the bottom, and the draft regulated by a governor or sliding valve *m*, at its top. The arrangement and construction of the interior of the stove will be clearly seen in some of the hereinafter described sectional figures, and, therefore, need not be further explained at present.

Fig. 2, is a front elevation of another plate warmer, which is shaped and formed as an oblong quadrangular closet or cupboard, with folding doors. The same letters of reference being marked upon this as the foregoing figure, no further description will be necessary.

Fig. 3, is an external representation of a tea or coffee urn, intended either to boil water or coffee, or keep the same at a required temperature. Fig. 4, is a section of the same. *a, a*, is the outer casing of the urn; the foot or standard *b*, is made hollow to admit of the passage of air to support the combustion of the fuel in the stove *c*; the air passes through apertures *d, d*, in the inverted cone *e*, placed at the bottom; *f*, is the exit valve or governor for regulating the degree of draft through the stove, and consequently the combustion of the fuel. In this instance, the regulator is placed in the lid or cover of the fuel chamber, in a short chimney *h*, which projects through the lid or cover of the urn; and by opening or shutting the

apertures of this valve, either by raising or lowering it, or turning the knob *i*, the degree of draft will be regulated.

Fig. 5, represents a section of a tea kettle;—the arrangement and method of heating being much like the urn just described, a short description will suffice; the same letters of reference being marked upon corresponding parts as in the latter figures. In this instance, the exit aperture of the stove or fuel chamber *c*, does not enter the lid of the kettle, and from the small dimensions of the stove, no regulating valve is required, the apertures for the admission of air being such as to allow only of the requisite degree to support the proper combustion of the fuel. The kettle may either be furnished with three or four legs, or placed upon a separate stand or trivet *k*, to allow the air access to the stove.

Fig. 6, is an external representation of an apparatus or urn for quickly heating or warming wine, beer, or other liquors, and at the same time containing a quantity of hot water. Fig. 7, is a section of the same, taken vertically. *a, a*, is the outer casing of the urn or apparatus; *b*, the stove or chamber for the fuel receiving its supply of air, to support combustion, through the apertures *c*, of the short tube *d*, attached to the bottom plate or moveable flap or shutter *e*, which is capable of being opened to remove any dust or ashes which may remain after the combustion of the fuel. The top or cover of the stove *f*, is supplied with the governor valve *g*, to regulate the degree of combustion; *h, i, k*, are three small funnels attached to the top of the urn, and supplied with covers. The liquids to be heated are to be poured into these funnels,—the one *h*, is for water, and opens direct into the interior of the casing or chamber *a, a*; the other *i*, is intended for beer, and is connected with the pipe *l, l*, which is coiled around the stove several times, and is

furnished with a cock *m*, at its lower end. The funnel *k*, is intended for heating wine or other liquids, which are generally required in smaller quantities than beer; it is connected to the pipe *n*, coiled a less number of times round the stove, and is furnished with the cock *o*. The other or water cock *p*, opens direct to the water chamber. The apparatus may be supported with any description of feet or standards, which will allow of the admission of air to the stove. It will be seen that the combustion of fuel in the chamber will communicate heat to the water in the urn, and that any liquid poured into the funnels *i*, or *k*, will, in its descent through the pipes *l*, *n*, become heated or warmed, and can be drawn off in this state by their taps or cocks.

Fig. 8, is an external representation of one of my improved ironing stoves or apparatus for laundry use, in which both Italian or frilling irons, as well as flat irons, are heated. Fig. 9, is a vertical section of the same. In this instance, the ironing apparatus is constructed with a double casing. *a*, *a*, is the outer casing, supported on legs in any convenient manner; *b*, *b*, is the inner casing stove or fuel chamber, supplied with the inlet and outlet apertures for air *e*, and *f*, as in the former instances; *c*, *c*, are the Italian or frilling irons, which are of different sizes, and placed so that two or more persons can use them at one time; the irons receiving their heat direct from the stove, they are attached either to the inner or outer casing; the latter is supplied with a cover *d*, which may be used or not, as thought necessary. The top of the fuel chamber *g*, can be removed to supply the fuel or ignite the same, and has the exit aperture *f*, formed in it. This cover, also, forms a hot plate, upon which flat irons, as at *h*, *h*, are to be placed for the purpose of heating them; *i*, *i*, are handles for carrying the apparatus from one place to another.

Fig. 10, is an external representation of an apparatus, which may be considered either culinary or domestic, as it is equally applicable for heating or warming irons for laundry use, or as a hot plate or stove for heating or boiling the contents of saucepans, or stewing, or preserving utensils, &c.; fig. 11, is a vertical section; and fig. 12, a plan view of the same, shewing flat irons placed on the hot plate.

In this apparatus the object is, to keep the ignited fuel as near to the top part, or hot plate, as possible. This may be effected by properly shaping the bottom of the stove, or top or cover of the inlet aperture for the air. *a, a,* is the casing of the apparatus, which is in the form of an inverted cone, and supported by legs or standards; *b,* is its top or cover, supporting the fuel chamber *c,* through which the fuel is supplied, and which may either be attached to the cover or not, as thought desirable; *d,* is the aperture for the admission of air to the fuel, which opens into the cone *e,* having the conical cover *f,* placed upon it, the air escaping to the interior of the chamber *a,* by holes *g, g,* formed in the cone *e.* After a portion of the fuel has been ignited in the chamber *a,* the remainder is to be placed in the chamber *c, c*; *h,* is the cover of the fuel chamber, which can be removed at pleasure, and the draft through the stove regulated by the governor *i,* as before stated.

Fig. 13, is a sectional figure, and fig. 14, a plan view of another ironing stove or hot plate apparatus, of the same description, in which the fuel chamber *c,* is placed at the end, in such a manner as to leave the whole of the hot plate or cover of the chamber *a, a,* to be used for the culinary or domestic purposes above named;—the same letters of reference being marked on corresponding parts to those last described, no further description will be required. The apparatus being supplied with a small exit

pipe, or tube *k*, furnished with a regulator *l*, to determine the degree of combustion; the air being admitted through holes or apertures at *m*.

A hot closet, for airing or perfectly drying linen and other articles, may be constructed after the manner of the plate warming apparatus, fig. 2; but the shelves should be formed of wires or rods, placed across the chamber, upon which, the articles may be hung loosely, or placed in piles upon them.

It will be evident, that this apparatus may be made of any required size, and is applicable to warming or drying various kinds of articles; and as there are no sparks allowed to escape from the fuel, danger of fire is avoided.

Fig. 15, is a side representation of a stove or apparatus, intended for heating liquids contained in baths, coppers, or other vessels, where the external application of a stove is inconvenient, and is intended to be placed in the water or fluid contained in such vessels, either floating or not, as may be desired. Fig. 16, is a vertical section of the same. *a, a*, is the casing or fuel chamber, which is supplied with fuel, as required, through the aperture or tube *b*, which may be of any length to increase the draft. The bottom of the stove or grating, to support the fuel, in this instance, is formed of hollow tubes *c, c*, open at their ends to the water in the bath, which is allowed to flow through them; *f*, is another tube placed in the same manner, and consequently increasing the heating surface. The passage for the air to the stove is formed by the side wings *g, g*, which are open by the ways *h, h*, to the under part of the grating or tubes. In applying this stove to the heating fluid, contained in a bath or other vessel, the fuel is first to be ignited in the chamber *a, a*, and then placed in the liquid, fuel being added until the same is raised to a required temperature; the apparatus is intended to be

sunk in the fluid, so that the same shall flow over the top plate of the fuel chamber, as shewn by the dotted water line in the figures.

Having now particularly described and ascertained the nature of my present invention, and the manner of carrying the same into effect, in the several novel or peculiar arrangements and constructions of apparatus, applicable to various culinary and domestic purposes,—I desire it to be understood, that I do not claim as any part of my present patent, the preparation of fuel herein before named; but I do claim the application of the said prepared fuel to any of the culinary and domestic purposes herein described. And I further claim, the improved modes of, and apparatus for, applying the prepared fuel, herein named, to the purpose of heating or warming, in the various culinary and domestic operations, as hereinbefore set forth and described, which are not contemplated, included, or described in my former patent, before alluded to.—[*Inrolled in the Rolls Chapel Office, September,* 1838.]

Specification drawn by Messrs. Newton and Berry.

To JAMES YATES, *of Effingham Works, Rotherham, in the county of York, iron-founder and earthenware manufacturer, for his invention of certain improvements in making, forming, or producing raised or projecting letters, mouldings, figures, or other ornamental work, for external decorations of buildings, and other purposes.*—[Sealed 3rd July, 1839.]

THIS invention of certain improvements in making, forming, or producing raised or projecting letters, mouldings,

figures, or other ornamental work, for external decorations of buildings and other purposes, applies, in the first instance, to a novel or improved mode, manner, or method of making, forming, or producing, separate raised or projecting letters or figures; as also what are commonly called "block letters," for the external decorations in writings on shop fronts, sign boards, tablets, direction boards, or names of streets, and other places; as well as for internal tablets, shew boards, names of proprietors, and various other purposes; for instance,—types, or reversed letters, for printing, and for many other purposes, wherein wooden or metal letters or types are now used. And, in the second instance, an improved manner, mode, or method of making, forming, or manufacturing other figures, or devices, or mouldings, as rosettes, or other such ornamental work, which can be made of the materials hereinafter named; and consists, in the first place, in the making, manufacturing, or forming, by means of pressure, such separate raised or projecting letters, figures, or types, of a new material, and in a novel and peculiar manner, (that is to say,) in earthenware, clay, porcelain-ware, or stone-ware, or glass, or other mixtures of earthy materials, in contra-distinction to those usually made or formed in metal, by casting it, in a fluid state, into moulds; or by raising or depressing the form of the letters, or mouldings, or figures, out of plates or sheets of metal, by dies and matrixes; or by cutting the shapes or forms of such letters, figures, or types, out of wood, and carving them into the shape required for the character or figure. And in the second place, in making, forming, or producing mouldings, rosettes, slabs, tablets, or other ornamental work, in a novel manner; that is,—by means of great or extraordinary pressure.

And I would here remark, as regards the first part of my improvements, that I am aware earthenware letters

may have heretofore been made, by cutting them out of sheets of soft clay or earthy materials; but such letters are imperfect from many causes, (viz.) the roughness of the edges, where they have been separated from the sheet; the imperfect drying, shrinking, and cracking of the material; the difficulty of keeping them in the required shape, previous to baking; and other causes. Also, the earthenware letters, so cut out, have, necessarily, (from the mode of making,) their sides straight, or at right angles to the plane or front thereof; whereas, by my improvements, my novel or improved letters, figures, or characters, may have their sides formed, at any angle, to the plane or front surface of the letter, and be formed perfect on all the edges, so as to ensure the correct form of the letter or figure; and moreover, the front surfaces of the letters or characters may have an indented, corrugated, or raised pattern or design, formed thereon, for the purpose of producing prismatic colours, different effects of light or shade in colours, gold and silver, in order to heighten or improve the effect or appearance; also they may be ornamented with patterns or devices painted thereon; such designs being enamelled or burnt into the earthenware or china, while the letters are being heated, as in the ordinary process of manufacturing earthenware or china articles.

It will be evident, that these letters, whether made of earthenware, china, or glass, or other mixtures of earthy materials, will not be liable to injury by exposure to weather, or the changes of temperature, as is the case with metal or wooden letters, with painted, coloured, and varnished surfaces.

And I would further remark, as regards the second part of my improvements, that I am aware mouldings, rosettes, and other ornamental work, has been heretofore formed of earthenware, or earthy materials; but such ornamental

work has only been formed out of such materials when in a wet, or damp, or soft state, as it is commonly used in pottery earthenware, or artificial stone manufacture; which articles, when so made, are subject to all the disadvantages above named, as regards the earthenware letters or figures, when cut out of sheets or layers of the materials; whereas, by my improved method of preparing and acting upon the earthy materials, I am enabled to produce a much better article, not subject to such disadvantages; and, therefore, the improvements contemplated and claimed by me, in the above-named letters patent, consist in making, or manufacturing, or forming such earthenware or glass letters, and earthenware mouldings, rosettes, and other ornamental work, by means of pressure, and suitable dies or matrixes, or counter-sunk tools, made of metal or other suitable substances or materials, and shaped of the required figure; into which moulds, matrixes, or dies, the soft or damp clay, or other earthy materials (or fluid mixtures thereof, when glass is used) is forced, by means of the pressure, and made to take the required form of the letters or figures, device or pattern, formed or counter-sunk therein. The tools, dies, and matrixes, may be worked by hand, or by machinery; and I will, therefore, proceed to describe the process and method I pursue in making or manufacturing the improved articles, and some modifications and arrangements of machinery by which the same may be carried into effect.

The mixtures of earthy materials or matters may be prepared after the usual manner of potters' clay, and then used in the manner hereinafter described; but, in order to obtain a more compact body, I prefer to use the earthy matters or mixtures of materials in a much dryer state than the usual consistency of potters' clay, or than has heretofore been used in the usual process of making pottery

ware. And moreover, in order still further to prevent the shrinking, the warping, and cracking, by contraction, I take ground baked clay, "biscuit," or "potsherds," and flint, and other siliceous powder, slightly moistened by "clay-slip," or by "clay-slip" mixed with "rice-water," which material is put under great pressure in the process of manufacturing the articles, in order to bring all the particles in close contact with each other. The material, after being properly prepared, is placed in a convenient situation, where the workman can readily supply a sufficient quantity to the moulds, ready to be passed under the press, in order to force the material into the die or matrix.

Fig. 1, Plate V., is a front elevation of one description of press adapted for this purpose; fig. 2, is a side view; and fig. 3, is a plan of the same, the top part of the framework being removed to expose the revolving table. *a, a,* is the frame, which may be made in wood or metal, and affixed by screws or bolts in any convenient situation; *b,* is the shaft of the follower or presser, which may be raised or lowered by a male and female screw, or by a lever, or other means, according to whatever agent is used, to give the required pressure; *c,* is the table, having an interrupted rotary motion given to it in any convenient manner. This table moves upon the cross-piece or bed *d,* and may be divided into several compartments, each of which carries a receptacle for a die or mould. The interrupted rotary motion of the table must be so arranged that the dies or moulds shall be made to stop at the required intervals and proper position under the presser *k,* a sufficient time for the forcing of the material into the mould to take place. The table is shewn in the drawings as having four receptacles *e, e, e, e,* for the dies, one of which is supplied with a mould in it, at *f.* The receptacles, in this instance, are counter-sunk dove-tailed recesses, formed in the table, the

moulds having a corresponding dove-tailed piece, fitted into the recesses, so that they may be readily applied and removed each time a letter or figure has been pressed or formed.

The manner of giving the interrupted rotary motion, as represented in the drawings, is as follows:—Around the table is formed a toothed wheel *g*, *g*, taking into gear with a toothed segment or half wheel *h*, mounted upon a shaft *i*, turning in suitable bearings; this shaft is turned with a continuous motion by a strap or toothed gear, from any convenient first mover. The wheel *h*, is of only half the diameter of the wheel *g*, and by having only half its periphery furnished with teeth, it consequently will give, as it revolves, to the table, the interrupted rotary motion required; the table resting, at each interval, with a die or mould under the presser or follower *k*, while it is made to descend by the action of the press, and force the material into the mould, which operation will take place while the blank part of the wheel *h*, is revolving next the table. And in order to ensure the table stopping and remaining with the die in the precise position required to bring the mould directly under the presser, the following contrivance is adopted:—

l, is a bolt or pin, sliding in bearings on the cross-piece *d*, of the frame; the upper end of this bolt projects upwards into shallow holes or recesses, formed in the under side of the table, beneath the receptacles *e*, *e*, and is forced upwards into these holes by means of the weighted lever *m*, whenever the mould arrives at the proper position, and thus stops and retains the table. In order to release the table, after a letter or figure has been formed, the following contrivance is used:—

Upon the depression of the follower *k*, a tappet *n*, on the shaft *b*, will have passed the end of the lever *o*, which it is

allowed to do by means of its joint to the stop-piece resting on the frame. This lever is connected by a rod *p*, to the weighted lever *m*; and as the shaft *b*, moves upwards, the tappet *n*, will come into contact with the end of the lever, and consequently raise it, and the stop-piece; and, by the connection with the lever *m*, withdraw the bolt *l*, and thereby release the table, which is now free to turn round the toothed segment *h*, at this time coming into contact with the wheel *g*. The table being moved, a portion of a revolution brings the next receptacle and mould under the action of the presser, the attendant having placed a mould, containing the proper quantity of material, in a receptacle on the one side, ready to pass under the presser, removing that which has undergone the operation on the other; it is then taken away, another applied, and so on.

Having described the several figures in the drawing, I would remark, that I do not intend to confine myself to the description of press therein shewn, nor to the use of a revolving table, as an oblong table, having an interrupted horizontal reciprocating motion given to it, may do equally well. The motion being such as to bring the receptacles, and moulds or dies, alternately, under the action of a presser, the moulds being supplied with the material on the one side of the follower, and removed on the other, after the operation has taken place.

The letters and figures, made of glass, are formed in the same manner as those of earthenware, (videlecit,) by pressing the materials in moulds, with this difference only,—that the glassy material is first to be heated into a melted state, and then placed into the dies or matrixes; the follower or presser being brought down into operation, so as to force the material into the recess of the mould or matrix, and drive away the superfluous parts; the proportions of the different matters, in the glassy materials, being

varied according to the colour intended to be given to the letters or figures. After the letters, or figures, or other articles, with flat faces, have been formed in the press, and dried, and baked in the ordinary kiln, I rub or grind their faces upon flat slabs of stone or metal, supplied with sand, emery, or other grinding materials, and thereby reduce any unevenness of surface, and produce a smooth flat face on the letters, fit to receive the colouring matter, gilding, or other ornamental material, and also the glazing; and when the reversed letters are used for types, for printing from, they may be left with the smooth ground surface, without any glazing or other preparation thereon.

The moulds, dies, or matrixes, in which the letters, figures, types, mouldings, or other ornamental work is formed, may be of any suitable metal, or mixture of metals, as in figs. 3, and 4, or they may be formed of earthenware or other earthy materials, hardened and baked, or they may be formed of plaster of Paris, or other plastic matters or compositions; but these latter materials must be secured, and supported within metal boxes or frames, to prevent the moulds bursting under the pressure required to force the material into the die.

The letters, figures, mouldings, or other ornamental work, after being completed, may be fastened in the required situations by cement, or by metal pins, driven through holes, formed in a slanting direction in the sides, previous to the letters being baked or hardened, or they may have small ledges or ears left upon their top and bottom ends, in order to slide into grooves in a frame, or they may be fixed and applied in any other convenient manner.

Having now described and ascertained my improvements, I would, in conclusion, remark, that what I claim as my invention, secured to me by the above in part recited

letters patent, is the making, forming, or producing of raised or projecting letters, mouldings, figures, devices, tablets, slabs, or other ornamental work, for external decorations of buildings and other purposes, in the manner hereinbefore described, out of the earthy matters or materials commonly used in pottery or earthenware manufacture; or from any mixture of earthy materials which will allow of the articles being pressed, dried, baked, ground, painted, glazed, and otherwise ornamented, and treated according to the purpose for which they are required. And I also claim the making of reversed letters, figures, or types, for printers' use, from earthenware or potters' clay. Likewise the making, forming, or producing separate letters, figures, devices, or characters, in glass, or mixtures of glass, and other materials, either opaque or coloured, as desired; all such earthy or glassy materials being prepared and forced into suitable moulds by means of pressure, in order to give the required form or figure, which is afterwards to be furnished or completed, as hereinbefore set forth and described. And, lastly, I claim the application of such raised or projecting letters, mouldings, figures, or other ornamental work, for the external decorations of buildings and other purposes, to which they are applicable. —[*Inrolled in the Rolls Chapel Office, January,* 1840.]

Specification drawn by Messrs. Newton and Berry.

To DAVID NAPIER, *of Millwall, Engineer, for improvements in iron steam boats.*—[Sealed April 23rd, 1839.]

THIS invention consists in constructing iron steam boats with double bottoms, and in applying the space between such bottoms for the purpose of condensing the steam from the engines without injecting water.

The figure, in Plate VII., represents a transverse section of an iron steam boat, constructed upon the above principles. *a*, being the space between the two bottoms *b*, and *c*, and when used as a condenser, another water-tight floor is required, as shewn at *d*, situated about an inch and a half above the floor *c*; in the space between *c*, and *d*, openings are made, both at the stem and stern, in order to allow the water to pass through for the purpose of keeping the bottom *c*, always cool. *e*, *e*, *e*, *e*, are plates of iron, like keelsons, which are rivetted to the bottoms *b*, and *c*, for the purpose of strengthening the vessel, and resisting the pressure.

The patentee says, he does not intend to confine his invention to the particular form and construction herein shewn, as it consists, generally, in constructing iron steam boats, with water-tight bottoms, of whatever shape or construction; also in applying the space, between the bottoms, to the purpose of condensing the steam from the engines. The advantages, arising from this method of constructing iron steam boots, are greater strength and safety; a saving of power in working the air-pump; and a saving in the wear and tear of the boilers, fresh water being always used; and as the quantity remains nearly always the same, accidents, arising from want of water in the boiler, can scarcely ever occur.

The patentee says, in conclusion, that in steamers of great magnitude, he would recommend the doubling to be continued up the sides.—[*Inrolled in the Inrolment Office, October*, 1839.]

To GEORGE DICKINSON, *of Buckland, near Dover, in the county of Kent, paper-maker, for an improvement or improvements applicable to making of paper.*— [Sealed 23rd December, 1833.]

IT is well known to all persons acquainted with paper making, that "laid" paper is made by passing a continuous sheet of paper pulp over, or on to a supporting sheet, made of a number of transverse wires, placed closely together, and connected and held in their proper places, by other wires placed longitudinally, and which are interwoven between the transverse wires. Upon holding up a sheet of "laid" paper to the light, a number of lines, placed very closely together, may be seen stretching across the sheet; other lines, placed at intervals of about one inch, and extending lengthwise of the sheet, are made by the wires that hold the transverse wires together, as before mentioned.

Now, as it has been found very difficult to obtain a sufficient degree of elasticity and pliability with these longitudinal wires, so as to make laid paper upon an endless cloth or belt—this description of paper has always been made by hand.

The object of the present invention, therefore, is to make an endless cloth or belt, in such a manner as to allow of its readily bending and unbending as it passes over and under the conducting rollers, and thereby admitting of the possibility of making laid paper by machinery, the principal difficulty against which, at present, is the liability of the longitudinal wires to crack and break from the continual bending and unbending to which they are subjected, when passing round the rollers. The patentee proposes employing cords, or strands made of

silk, flax, hemp, cotton, wool, or other fibrous substances, in place of the longitudinal wires, above mentioned. These strands or threads are wound over and under, and interwoven with the transverse wires, so as to hold them firmly, and yet, at the same time, have the necessary pliability, and will also make a similar mark upon the paper as is made by the longitudinal wires above referred to. The extreme ends of the transverse wires are bound with a tape, which over-laps them about half an inch, and thereby prevents them from catching in any part of the machinery, and causing any derangement or obstruction.

The patentee claims, the employment of cords made of silk, cotton, flax, hemp, wool, or other fibrous materials, for binding or connecting the transverse wires together, instead of the metallic strands hitherto used for that purpose.—[*Inrolled in the Petty Bag Office, June*, 1834.]

To John Augustus Manton, *late of Calcutta, in the East Indies, but now residing with his brother, at the Small Gun Office, in the Tower of London, gun-maker, for his invention of certain improvements in fire-arms.*—[Sealed 13th March, 1834.]

This invention is described, by the patentee, in the following words:—

Fig. 1, Plate VII., represents a patent breech of a fowling piece, or other fire-arm, into which is fitted, by screwing, a hardened steel cup A, having a conical cavity within it; this cup A, is shewn, separately, in fig. 2, and in section at fig. 3. Into the steel cup A, wooden cones, or cones, formed out of any other fit and proper material or materials, are fitted, one of which is shewn at B, in fig. 4,

and in section at fig. 5. These wooden or other cones B, are made with a cylindrical hole in each, as shewn in the section, fig. 5, in order to receive an iron cylindrical pin C, shewn separately in fig. 6. The upper end of the cylindrical hole, in the cone B, is widened a little, as shewn in fig. 5. At the lower end of this cylindrical hole, a detonating pellet D, shewn, separately, in section, at fig. 7, and in plan at fig. 8, is securely fastened with a water-proof varnish, or other proper cement. Fig. 9, represents the cock or hammer of the gun-lock, into the front of which is screwed a hardened steel striking-pin E, shewn edgeways in fig. 10, and in plan at fig. 11; in the latter of which figures are also shewn the two gaps or notches F, F, for the wrench or turn-screw to enter, by means of which the steel pin E, is screwed into the cock.

The effect of this arrangement will be, that the iron pin C, in the centre of the wooden or other cone B, upon being struck by the steel pin E, upon pulling off the lock, will be instantaneously driven down upon the detonating pellet D, and explode it, and thereby discharge the fire-arm.

It should be observed, that the lower part of the conical cavity, within the steel cup A, is contracted into a smaller cone, and terminated by a small cylindrical hole, as shewn in section at fig 3. Around the edges of this small cylindrical hole, the blow or effect of the iron pin C, in striking upon these edges, is received, and explodes the detonating pellet.

In order to apply this improvement to a plain gun-barrel, without a patent breech, it will be necessary to have a piece of iron, firmly affixed by brazing or otherwise, to the side of the barrel, in order to receive the hardened steel cup A, and other parts, as shewn in fig. 1; and also to make the iron cylinders C, C, longer, or to project out, above the wooden or other cones B, B, for about a quarter

of an inch; in which case, the cock or hammer of the gun-lock need only be made flat, similar to those employed in exploding the common copper caps, and not to be provided with the steel pin E, as above-mentioned.

Fig. 12, represents another of my said improvements in fire-arms, whereby a fowling piece, or other fire-arm, may be rendered capable of priming itself. G, is a small steel nipple, similar, but shorter than those commonly used for copper gun caps, and which is fitted by screwing into the patent breech of the gun;—this nipple G, is shewn, in section, at fig. 13.

H, in fig. 12, is the lock-plate; the lock being constructed on the back-action principle, and well known to gun-makers, it need not be further described here; I, is a lever turning upon pivots underneath the bridle J; K, is a bent spring, acting against the shorter end of the lever I; a friction roller L, is mounted on pivots in the longer arm of the lever I, and which, acting against a projecting part M, of the vertical slider N, always tends to keep the slider up; O, is a horizontal slider or striking-pin, which is generally held back by the action of the spring P. The vertical slider N, serves to raise up or convey a metallic primer Q, received from the primer-magazine R, beneath the barrel of the gun, to its station above, as shewn in fig. 14, or opposite to the nipple G, shewn in fig. 12, and where it remains ready to receive the blow from the cock of the gun, communicated to it through the agency of the striking-pin O; and thus, on pulling the trigger, the primer Q, is rapidly driven or forced against the nipple G, and the detonating prime, contained within a cavity, formed to hold it at one end of the said metallic primer, is exploded by the percussion, and fires the gun. This vertical slider N, is shewn separately in fig. 15.

Fig. 16, is a section through the lock-plate H, taken at

the dotted line S, S; fig. 12, shewing the vertical slider N, N, as having received one of the metallic primers Q, and raised it to its station above. There is a mortice T, T, made in the inner edge of this vertical slider N, as shewn in fig. 16, to receive the point of a stop-screw V, and thus to limit its motion upwards and downwards.

Fig. 17, represents another section of the lock-plate H, taken at the dotted line V, V, in fig. 12, and shewing the back end of the horizontal striking-pin O, and its spring P, and also the lever I, and friction roller L, and bridle J, the friction roller being seen in contact with the projecting part M, of the slider N.

Fig. 18, is a separate view of the horizontal slider O, which has a solid ring W, formed upon it, to act against the screwed socket X, shewn in fig. 14, which is screwed into the lock-plate H, after the slider is inserted; and thus to prevent the slider from being withdrawn. The spring P, has a cap or notch made at its upper end, which receives the hook Y, within it, and thus preserves the slider in a proper position.

Fig. 19, is a metal tube R, or magazine, to contain the metallic primers and likewise a spiral spring;—these are shewn in the section of the tube at fig. 14. The tube R, has a slit Z, Z, made along it, part of its length, as shewn in fig. 19, and a notch or gap *a*, at one end of the said slit; into this gap a stop-screw *b*, which is screwed into a metal cylinder *c*, can be introduced, and which serves to confine the spiral spring from acting whilst the magazine is being filled with metallic primers, as shewn in fig. 14. When the magazine is filled, the stop-screw must be removed from the gap *a*, but not until the magazine is put into its place underneath the gun-barrel, as shewn by dotted lines in fig. 12.

In fig. 20, *a*, is an external view of one of my metallic

primings, a section being shewn in fig. 21, in which figure, *e*, represents a small cavity, formed in one end of the primer, to contain the detonating prime.

The magazine R, has its open end placed close to the vertical slider N, and when the latter is depressed or slidden down, by the action of the thumb of the sportsman, upon the projecting part M, it will receive a primer, in a semi-circular cap, formed upon the upper end of the slider; and which, upon allowing the slider to ascend, will be raised with it, and lodged between it and another semi-circular cap, made in the lock-plate H, and will be retained there by the action of the lever I, and its spring K, until it is drawn rapidly and forcibly against the nipple G, by the action of the main-spring of the gun-lock, when, as aforesaid, the detonating prime will be exploded, and the gun discharged. The metallic priming, thus exploded, will drop out through a side opening *f*, when the lock is at the half-cock. Another primer will of course be received upon the upper end of the vertical slider N, every time it is depressed, until the whole contents of the magazine are expended; the metal cylinder *c*, will then project beyond the tube R, and prevent the vertical slider N, from rising.

I do not intend hereby to claim, as my invention, any of the individual parts herein shewn and described, but only their combinations and applications to the above purposes; and particularly the application of conical detonating primers directly to the breeches of fire-arms, either in conical metal caps, screwed into the breeches, or formed in the breeches themselves; and also the arrangement for discharging fire-arms, by means of small metallic detonating primers contained in a magazine, and supplied, one at a time, as required.—[*Inrolled in the Rolls Chapel Office, September*, 1834.]

To JOHN DICKENSON, *of Bedford-row, Holborn, in the county of Middlesex, Esquire, and* WILLIAM LONG TYERS, *of Apsley Mills, in the parish of King's Langley, in the county of Hertford, for their invention of certain improvements in the manufacture of paper.*—[Sealed July 24th, 1835.]

THIS invention is divided into two parts, consisting, firstly, of a method of extracting from the paper pulp, such particles of iron and steel as should become chipped or knocked off from any part of the machine during the process of making paper, and which would otherwise become incorporated in the paper, and thereby occasion marks and blemishes from the metal rusting.

The second part of the invention, has for its object, the more even and regular distribution of the pulp over the surface of the perforated cylinder, on which the paper is formed.

In paper machines, of the present construction, the cylinder, as it revolves in the pulp vat, has a tendency to lay the fibres of the pulp in a lateral direction,—this has been found to be disadvantageous; and, therefore, the patentees propose to lay the fibres, either in a transverse or diagonal direction, as well as in a lateral one, or rather to prevent the fibres of the pulp from laying *regularly* in a lateral direction.

The first part of the invention, or mode of extracting particles of iron or steel from the pulp, is effected by placing a number of strong magnets at the bottom of a trough, and causing the paper pulp to flow over them; all particles of steel or iron will thereby become arrested, and prevented from combining with the sheet of paper.

The second part consists of an apparatus, which has a

tendency to arrest the pulp in its forward motion, and cause it to deposit the fibres, either transversely or diagonally. This apparatus is a fluted shield, partially enveloping the pulp cylinder, and between which the pulp is obliged to pass. The shield, being fluted like a scollop shell, partially arrests the pulp, and causes it to be deposited in a diagonal or transverse direction, as well as the lateral one, which is effected by the revolution of the cylinder.—[*Inrolled in the Inrolment Office, January,* 1836.]

To THOMAS CLARK, *and* CHARLES CLARK, *of Wolverhampton, in the county of Stafford, ironmongers, and co-partners, for an invention for glazing and enamelling cast-iron, hollow-ware, and other metallic substances.*—[Sealed May 25th, 1839.]

THIS invention is for a method of enamelling or coating the internal surface of iron pots or saucepans, in such a manner as shall prevent the enamel from cracking or splitting off, from the effects of the heat arising from a fire upon which the pot or saucepan may be placed.

The first part of the operation is cleaning, or preparing the internal surface of the iron vessel, in order to receive the enamel coating or covering, and consists in submitting the vessel to the action of an acid solution of from 16 to 20 gallons of water, acidulated in such a manner, by sulphuric acid, so as to be just perceptible to the taste; the vessel is to remain immersed in the acid solution for three or four hours, after which, it must be well scoured with fine sand in clean spring water; and after the vessel has been boiled in pure water for a short time, the first composition or ground may be applied.

This composition consists of the under-mentioned ingredients, mixed in the following proportions: — One hundred pounds weight of flint, calcined and ground fine to powder; add thereto, fifty pounds weight of borax, calcined and finely ground with the above; fuse the mixture and let it cool gradually; then take forty pounds weight of this product, and with five pounds of potters' clay, grind it well in water until it arrives at such a consistency as will admit of its being laid on the vessel; this is effected by washing the internal surface thereof with the composition until it has a coating of about a sixteenth of an inch in thickness; when this coating becomes set, which it will do in about five or ten minutes, add the second composition, consisting of one hundred and twenty-five pounds of white glass, which must have been manufactured without lead, twenty-five pounds of borax, and twenty pounds of soda; pulverize the above together, and vitrify them; when cooled, grind the product in water, and afterwards dry it. Take forty-five pounds of this mixture, and add thereto, one pound of soda; mix them together in hot water, and when dry, pound it and sift it finely over the internal surface of the vessel, previously covered with the first coating or composition. This second composition is for the purpose of glazing the first; and when the vessel is prepared in the manner above-mentioned, it must be put into an oven or kiln, and baked at the temperature of about 212° Fahrenheit.

The patentees claim, as their invention, coating or covering cast-iron, in the manner above described.—[*Inrolled in the Inrolment Office, November,* 1839.]

To John Alexander Philip de Val Marino, *of Margaret-street, Cavendish-square, in the county of Middlesex, Esquire, for his invention of certain improvements in the manufacture of gas, and in the apparatus employed for consuming gas, for the purposes of producing light.*—[Sealed 22nd June, 1839.]

This invention is divided into two parts, and relates, firstly, to an improved method of manufacturing gas, for the purposes of light, from coal or other tar, and oils, and other fatty substances, in combination with water; and, secondly, an improved construction of burner for consuming the gas for the purposes of light.

The first part of the invention has for its object a more perfect decomposition of tar, oils, and other fatty matters, and water, by means of which a more perfect combination of the gases evolved, and consequently a more beneficial result, will be obtained. The nature of the apparatus and process is such, that the tar, oil, or other fatty matters employed, is completely decomposed by being exposed to highly heated surfaces of charcoal or coke, and the water is also completely decomposed in suitable vessels.

The products arising from the decomposition of the water, are brought into a highly heated retort or other vessel, filled with coke or charcoal, wherein the process of decomposing the tar, or oils, is going on, and such is the chemical action and re-action of the gases, that the carbon contained in the tar, oils, or fatty matters, becomes fully saturated, and the whole or very nearly the whole of the carbon is thereby obtained in the state of carburetted hydrogen gas.

It is well known that when different oils or tars are decomposed, they evolve different proportions of hydrogen,

oxygen, and carbon, and they will consequently require the decomposition of more or less water to make up the deficiency of hydrogen and oxygen, in order to perfectly saturate the carbon, so as to produce a gas which will be found serviceable. It is therefore necessary to know how much water it will require to decompose, to make up the deficiency in certain tars or oils,—but, as an analysis of all these matters may be found in most chemical works, it will not be necessary to enter more largely into the subject, further than to remark, that one atom of carburetted hydrogen, consists of two atoms of hydrogen and two of carbon; and one atom of oxide of carbon, consists of two atoms of carbon and one atom of oxygen; and as water, when decomposed, produces twelve per cent. of hydrogen, and the rest oxygen—it follows, that having ascertained the quantity of oxygen, hydrogen, and carbon, contained in the particular material to be employed in the manufacture of gas, the quantity of water required to be decomposed, to make up the deficiency of hydrogen and oxygen, will be immediately known.

Fig. 1, Plate VII., represents a section of the apparatus to be employed in decomposing the materials employed in the manufacture of gas.—It consists of three vertical retorts, suitably arranged; and the furnace is so constructed, that the said retorts may be conveniently heated, and maintained at an uniform temperature. *a*, *b*, and *c*, are the retorts;—one is employed for decomposing the tar oil, or other fatty matter; the second for the decomposition of the water; and the third for continuing the decomposition of the products of the water.

It is not of any material consequence which of the retorts are employed for the separate duties, as they are all similarly constructed; but, in the arrangement, shewn in the

drawings, *a*, is the retort for decomposing the water; *b*, the retort in which the tar or oil is decomposed; and *c*, is the retort for the further decomposition of the gases evolved from the retort *a*. The object of this arrangement is to fully decompose the water before the products thereof come into the retort *b*, to combine with the products of the other retort. *e*, is a vessel placed above, and contains tar, oil, or other fatty matters; and *d*, is a similar vessel, containing water; *f, f*, are syphon pipes, furnished with stop-cocks, and communicating with the vessels *d, e*, and the retorts *a, b*.

At the lower end of each retort, a grating of fire-bars is made to support the coke or charcoal contained therein; and underneath this grating, a descending pipe or tube *g*, is attached to the retort. The retorts communicate with each other, at their upper and lower ends, by means of the pipes *h*, and *i*. The retorts are filled from above by removing the cap or cover, and require replenishing about once in twenty-four hours; when filled, the cap or cover is replaced, and fastened down air-tight; and the retorts being kept at a white heat, the tar, oil, or other fatty matter, and also the water, is allowed to flow from the vessels above, through the syphon pipes, into their respective retorts, and become decomposed.

In order to arrange the apparatus to perform the decomposing process, with precision, so as to decompose a proper quantity of water, in proportion to the quantity of tar or oil, it will be necessary to have a gas-burner near the retort, and within sight of the workman;—by this means he will, from time to time, be enabled to observe the result of the operation; and if the flame of the burner becomes more coloured than is proper, it will indicate a deficiency of water; and when once the apparatus is set right, by this

simple means, it will go on correctly, unless some unforseen impediment arises. *j*, is a gas-pipe, leading directly to the gas-meter,—as carburetted hydrogen gas, made by this process, requires no purifying, which is an important advantage derived from this invention.

The patentee states, that he usually employs coal-tar for making the gas; and he does not confine himself to the particular arrangement of apparatus herein shewn.

The second part of the invention is shewn at fig. 2, which represents a section of an Argand gas-burner, constructed according to my improvement. Burners, of the ordinary construction, are perfectly cylindrical, or nearly so, from top to bottom;—now this improvement consists in forming the top of the burner in the form of a cone, as in the figure; by inspecting which, it will be seen that the top is gradually bevelled off from the point *a*, to the point *b*;—an outer cone *c*, is supported by the gallery which carries the glass chimney.

Now, the effect of this arrangement will be, that the air, to support combustion, must pass between the outer cone *c*, and the burner; and as the upper part of the burner is made in the form of a cone, the air will rush up and impinge upon the flame, and thereby effect a more perfect combustion of the gas. The patentee remarks, that he is aware that cones have been used in combination with ordinary cylindrical burners,—he therefore only claims them when employed in connection with burners of the constructino above described.

The claim set forth at the conclusion of the specification, is for the mode of manufacturing carburetted hydrogen gas from tar, oil, or other fatty matters, as before described; which is, by completely decomposing the water before the products, arising therefrom, are permitted to enter into

that portion of the apparatus wherein the tar, oil, or other fatty matters are decomposed, and causing the combined products to pass in contact with heated surfaces; and also the mode of constructing the apparatus, for consuming gas, as above described.—[*Inrolled in the Inrolment Office, December*, 1839.]

To James Guest, junior, *of Birmingham, in the county of Warwick, merchant, for improvements in locks and other fastenings, being a communication from a certain foreigner residing abroad.*—[Sealed 2nd December, 1839.]

This invention of improvements in locks, is described as consisting of a novel mode of constructing locks and fastenings, whereby the bolts or catches, which move on axes, are acted upon by keys or handles, at or near their centres of movement. Although the specification is of considerable length, and is illustrated by four sheets of drawings, yet the construction of the lock or locks is but imperfectly described; and the method of locking and unlocking, with the advantages to be derived from its use, are left to the ingenuity and imagination of the reader.

There are four different modifications of the invention shewn in the drawings; all are, however, constructed on one principle, namely,—that in which the bolt is mounted on a centre pin or axle. The lock is so constructed, that when the bolt is not used to secure the door from being opened without a key, it may be employed as a common spring catch or bolt, as in common door locks; and may be opened by handles, either from the inside or outside.

To effect this object, the outer part of the bolt, or that which projects from the box of the lock, is formed as an inclined plane, in the same manner as the spring catches of common door locks.

When it is desired to lock the door, the key is introduced into the key-hole, and the bolt is turned round, and thereby shot forward into the recess, formed in or attached to the jamb of the door. Wards are formed on the back or front plate of the lock, so as to render it difficult to open the lock without the proper key; and the bolt is shot forward by the key being pressed into a groove, formed on a projecting part of the bolt; and also depressing two springs, which would otherwise prevent the bolt from advancing. A spring, which bears against the lower end of the bolt, assists in forcing it forward when the key is inserted; this spring also brings the bolt into its right place, when it is depressed upon shutting the door, during which movement the outer end of the bolt is pressed back in the box of the lock, by its being brought into contact with a corresponding projection on the jamb of the door, as is well understood. The other three modifications are slight alterations in the shape of the bolt or manner of shooting it.

The patentee has also described an addition to be made to a lock, which will render it difficult to pick; and also a method of preventing the extraction of a false key, when an attempt is made to open a lock with a wrong key.

The first of these improvements consists in suspending two or more plates of steel inside the lock, but before the key-hole. These plates of steel the patentee denominates "screens," as they prevent the interior of the lock from being examined from the key-hole. The screens are suspended loosely from a point above, and have holes, of an irregular shape and size, formed through them, for the

purpose of admitting the key. The screens are so arranged, that, when in a quiescent state, they only present a very small opening for the admission of the key, but will admit a much larger key than the proper one.—This arrangement is made for the purpose of misleading any person who may attempt to examine the interior of the lock, for the purpose of making a false key. The barrel or shaft of the key, for opening a lock of this description, is pointed, so as to enter the small opening between the screens, which are radually expanded as the key is introduced.—[*Inrolled in the Inrolment Office, June,* 1840.]

To CHARLES ADOLPHE ROEDERER, *of Wellington-street, City-road, for an improved method or process of manufacturing or preparing the chemical salts, called acetates.*—[Sealed 9th April, 1839.]

THE patentee commences his specification by stating that in the various processes hitherto employed in the production of acetates, and particularly in the manufacture of the acetate of lead, the base is mixed with liquid acetic acid, either in a weak or concentrated state. This mode of operating, has, however, many disadvantages, such, for instance, as the expense of fuel, labour, and apparatus, also a serious loss of time and acid, as well as the difficulty of producing acetates of pure quality, capable of perfect crystallization.

By the improved process, hereafter described, most of these disadvantages are entirely obviated, and the remainder considerably ameliorated.

The present invention consists in employing the acid in

the state of vapour, instead of using it in the form of a liquid. The apparatus, employed for carrying the improved process into effect, consists of a vessel of a suitable size, according to the quantity of acetate required to be made at once. This vessel must be made of such materials as are not acted upon by the acid, and the top thereof is hermetically closed by a cover, which is fastened down in any convenient manner. In the lower part of this vessel a false bottom, perforated with minute holes, is placed, or a coiled tube, minutely pierced with holes, may be employed instead of the perforated false bottom. Through this tube or false bottom, the vapour of acetic acid is allowed to pass freely, and in order to prevent the loss of acid, several perforated shelves or diaphragms, (similar to the false bottom,) may be placed at different altitudes throughout the vessel. On each of these shelves or diaphragms, a layer of litharge is spread, if acetate of lead is to be produced,—or other base, according to the acetate required; after which, the cover must be hermetically closed; then, by means of a distilling apparatus, of the ordinary construction, liquid acetic acid, strong or weak, pure or impure, must be converted into vapour, and conveyed by a suitable pipe into the coiled tube, or between the false and real bottom of the vessel containing the base, which is to be converted into an acetate; and as the vapour rises up through the perforated bottom and shelves, and diffuses itself throughout the vessel, the acid enters into combination with the base employed, and thereby forms an acetate, which falls to the bottom of the vessel; and as, in its descent, it meets with the ascending vapour, it becomes completely neutralized by the acid. When the acid combines with the base, the more aqueous parts of the vapour become liberated; and, as they maintain their

temperature, they ascend, and in their passage, pass through the successive layers of the base, thereby becoming deprived of acid that may remain; the vapour being thus reduced to simple steam is allowed to escape at the top of the vessel, from whence it is conveyed by a pipe to a worm placed in the vessel containing the mother liquor or acetic acid, and thereby assists, by its heat, in evaporating the said acid.

The distillation of acid is continued until the base in the vessel has become thoroughly saturated, and has arrived at a proper degree of concentration for crystallization; as the operation of saturating the base draws to a close, the vapour issues from the top of the vessel, highly charged with acid; this vapour is, therefore, conducted into another vessel charged with a superabundant quantity of the base, so that no acid is wasted, and the operation may continue in the first vessel until completed.

The patentee says that, it is evident, a great saving of fuel is effected, as by this improved process, the operation finishes where the ordinary one begins, and the mother liquor is evaporated by the latent heat of the aqueous vapour. The apparatus is very cheap and simple, and as it is self-acting, much labour is dispensed with; and, finally, as the temperature of the acetate never exceeds that of the vapours, the crystalline product is of a much finer quality than is generally obtained.—[*Inrolled in the Inrolment Office, October,* 1839.]

Scientific Notices.

REPORT OF TRANSACTIONS OF THE INSTITUTION OF CIVIL ENGINEERS.

March 17, 1840.

HENRY R. PALMER, V. P., in the Chair.

"An Account of the Performances of the Locomotive Engines on the London and Birmingham Railway, during the year 1839."
By Edward Bury, M. Inst. C. E.

The engines used on the London and Birmingham Railway are all constructed on the same principle as to the main parts, the whole being upon four wheels, and only differing from each other in some of the minor details. The engines used for the conveyance of passengers have cylinders 12 inches diameter, with an 18-inch stroke; the driving wheels are 5 feet diameter, and the carrying wheels 4 feet diameter. The merchandize engines have cylinders 13 inches diameter, with an 18-inch stroke, and differ from the others in having all the wheels of 5 feet diameter, and coupled together. The framing is of wrought-iron, fixed inside the wheels for the greater convenience of connecting it with the boiler. The cylinders are attached to the frame by two strong wrought-iron bars, passing beneath the lower semi-diameter, and secured by bolts to the ears cast on them. The cranks and fore-axles are also fixed to the frame. By this arrangement, any concussion is received directly by that part of the machine best calculated to bear it; and when the force of the engine is exerted in either pushing or drawing, it is done directly through the line of the framing, and thus any strain is diverted from the boiler,

or from those parts of the machine liable to be injured. There are only two bearings on the axles, and they are inside the wheels. Any tendency towards depression in the centre, from the weight, would be counteracted by the continual upward pressure, arising from blows received by the flanch of the wheels striking against the rails on curves, passing crossings, &c. The bushes, which the axles run in, are fitted into the frame in such a manner as to allow the springs to play vertically, but have flanches, which prevent any tendency to lateral action beyond that necessary for the irregularities of the road, and they are of such a length as to enable them to hold up the engine in case of the breakage of one of the axles. It would appear that the breakage of the axles is a very rare occurrence, and that even when it has happened, the engines have performed the remainder of the journey, and brought home the train with only a slight diminution of speed. The engines differ in weight according to the class they belong to. A passenger engine, with its coke and water in the fire-box and boiler, weighs 9 tons 13 cwts. 1 qr.

	Tons.	cwts.	qrs.
The fore end	3	19	1
The after end	5	17	2

A merchandize engine, with coke and water, weighs 11 tons 13 cwts. 1 qr.

	Tons.	cwts.	qrs.
The fore end	5	4	1
The after end	6	12	3

This form of engine was adopted by the author as early as the year 1829, when he constructed the "Liverpool," which was the original model engine, with horizontal cylinders and cranked axles. It was set to work on the Liverpool and Manchester Railway in July, 1830. This form of engine has been invariably used on the London and Birmingham Railway since its opening.

The paper is accompanied by complete drawings of the engines, and tabular statements of their performances during the year 1839, showing the number of miles traversed by each engine,

the weight conveyed, with the cost in detail of coke, oil, tools, wages, repairs, and general charges.

The performances of the engines extend over a distance of 700,000 miles, and a period of 12 months; and it appears, that with the passenger engines,—

For the first 6 months, the average total cost of conveyance was . . . $\frac{\cdot 352}{1000}$ of a penny per ton per mile.

For the second 6 months, the average total cost was . . . . $\frac{\cdot 380}{1000}$ ditto

While with the merchandize engines,—

For the first 6 months, the average total cost was . . . . $\frac{203}{1000}$ ditto

And for the second 6 months, the average total cost was . . . . . . $\frac{227}{1000}$ ditto

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"Earth Falls at the Undercliff, in the Isle of Wight." By William Rickman.

The remarkable tract of coast, called the "Undercliff," extends from the south point of the Isle of Wight, nine miles to the eastward. Its surface is distorted in form, somewhat resembling, in miniature, the volcanic features of Southern Italy; for although the latter has been formed by the action of fire, and the former by that of water, both have been moulded when in a state of partial fluidity. The soil is of a boggy nature, is intersected with numerous springs, and in it are imbedded, in the utmost confusion, detached masses of the weather-worn cliff rock, forming, in places, natural terraces on the face of the cliff, and inclining inwards at different angles towards the land.

A sectional view, taken through the south point, bearing north to the summit of St. Catherine's Down, would present these features.

From the sea beach of iron sand, strewed with shingle and boulders, rises a cliff of 60 feet, and from it a rugged and irregular ascent of 320 feet in height, half a mile in extent, composed of vegetable soil, chalk, green sand-stone in masses and fragments, and of blue marle, the whole mingled indiscriminately, and irrigated by numerous springs. Thus much constitutes the "Undercliff." Above it appears the perpendicular, serrated profile of the Upper Cliff, 260 feet in height, from which the surface of the Down proceeds, with a slight descent for a quarter of a mile, and then gradually rises, in the extent of half a mile, to a vertical height of 200 feet, being the highest land in the island,—780 feet above the level of the sea. The strata are nearly horizontal, with a slight dip to the north-east. They are the upper part of the secondary or supermedial order, and consist of chalk, chalk-stone, green sand-stone, blue marle, and iron or red sand.

This stratification would account for the subsidences of the Cliff, which have occurred so repeatedly. The water, collected by the extensive surface of the Down, would percolate through the chalk and sand-stone beds, until it reached the impervious blue marle, where it would accumulate until it finally escaped by oozing out over the edge of the stratum, carrying with it portions of the sandy subsoil; in this state it has the appearance of a slimy grit, consisting of particles of the sand-stone, lubricated with clay; it is familiarly called "the blue slipper." A continuation of this infiltration, for any length of time, must end by undermining certain portions of the face of the Cliff, which, being unsupported beneath, detach themselves from the main rock and settle; the first settlement may not exceed a few inches, but a fissure having been formed the whole length behind the subsidence, the surface water pours into it, and continuing to moisten and undermine it, at length causes the slip to assume its present aspect. This soakage of water, at the back of the mass, may be supposed to sap its foundation at the rear, and to give it the dip inwards, which is observed in all cases, and most evi-

dently in such as are farthest advanced in their descent. A number of natural terraces are thus formed, and the process may be traced in every stage of its progress at different parts of the Cliff, as at Mirables, in the Pelham Walks, at Ventnor, and at the Luccombe Landslip. These subsidences appear to have succeeded each other at long intervals of time, but there is no record of any so extensive as that which occurred in 1799, at which time upwards of 100 acres were set in motion. That the principal landslips took place prior to the Norman Conquest is proved by the existence of Bonchurch and St. Lawrence Chapel, which are supposed to have been built soon after the manor was surveyed for entry in Doomsday Book.

The President observed, that although papers of this kind did not appear to be exactly adapted for the meetings of the Institution of Civil Engineers, yet, as geology was so intimately connected with engineering, and as it was always essential to ascertain, accurately, the nature of the ground where works were to be executed, such communications became not only acceptable, but very valuable, to the profession.

Mr. Lowe had paid much attention to a similar formation at Hastings, and while he agreed to the general correctness of the observations, he did not think a sufficient reason had been assigned for such a mass of iron sand, with its incumbent chalk, being driven seaward. He would attribute the subsidences, at the Undercliff, to the action of water percolating through the fissures into the thin beds of clay, interspersed with lignites, with which the iron sand abounded. This, when moistened, would ooze out and permit the chalk to crush it outwards, causing the subsidences so ably described by Mr. Rickman.

List of Patents

Granted for Scotland subsequent to September, 1840.

To George Saunders, of Hooknorton, in the county of Oxford, clerk, and James Wilmot, of the same place, farrier, for improvements in machinery for dibbling or setting wheat and other grain.—Sealed 25th August.

Charles Wye Williams, of Liverpool, in the county of Lancaster, gentleman, for improvements in the means of generating heat, principally applicable to the production of steam, and the prevention of smoke.—Sealed 28th August.

Thomas Gadd Matthews, of the city of Bristol, merchant, and Robert Leonard, of the same place, merchant, for certain improvements in machinery or apparatus for sawing, rasping, or dividing wood or turnery work.—Sealed 31st August.

Miles Berry, of the Office of Patents, 66, Chancery-lane, in the county of Middlesex, patent agent, (being a communication from abroad,) for certain improvements in the strengthening and preserving ligneous and textile substances.—Sealed 1st September.

Peter Fairbairn, of Leeds, in the county of York, engineer, (being a communication from abroad,) for certain improvements in machinery or apparatus for heckling, combing, preparing, or dressing hemp, flax, and such other textile or fibrous materials.—Sealed 7th September.

Thomas Milner, of Liverpool, in the county of Lancaster, for certain improvements in boxes, safes, or other depositories, for the protection of papers or other materials from fire.—Sealed 8th September.

John Johnstone, of Glasgow, in the county of Lanark, North Britain, gentleman, for a new method, by means of machinery,

of ascertaining the velocity of, or the space travelled through, by ships, vessels, carriages, and other means of locomotion, part of which is also applicable to the measurement of time. —Sealed 14th September.

Edwin Travis, of Shaw Mills, near Oldham, in the county of Lancaster, cotton spinner, for certain improvements in machinery or apparatus for preparing cotton and other fibrous materials for spinning.—Sealed 15th September.

Henry Curzon, of the Borough of Kidderminster, in the county of Worcester, machinist, for improvements in steam-engines. Sealed 16th September.

George Gwynne, of Portland-terrace, Regent's-park, in the county of Middlesex, gentleman, for improvements in the manufacture of candles, and operating upon oils and fats.— Sealed 16th September.

Henry Waterton, of Fulmer-place, Gerrard's-cross, in the county of Buckingham, Esquire, for certain improvements in the manufacture of sal ammoniac.—Sealed 16th September.

John Gibson and Thomas Muir, both of Glasgow, in the Kingdom of Scotland, silk manufacturers, for improvements in cleaning silk and other fibrous substances.—Sealed 17th September.

James Stirling, of Dundee, engineer, and Robert Stirling, clerk, D. D. of Calston, Ayrshire, for certain improvements in air-engines.—Sealed 17th September.

James Harvey, of Bazing-place, Waterloo-road, in the county of Surrey, gentleman, for improvements in extracting sulphur from pyrites, and other substances containing the same.— Sealed 21st September.

Gerard Ralston, of Tokenhouse-yard, in the city of London, merchant, (being a communication from abroad,) for an invention of improvements in rolling puddle balls, or other masses of iron.—Sealed 22nd September.

New Patents

SEALED IN ENGLAND.

1840.

To John Whitehouse, the younger, of Birchall-street, Birmingham, brass-founder, for improvements in the construction of spring hinges and door springs.—Sealed 3rd September—6 months for inrolment.

Mark Freeman, of Sutton Common, Surrey, gentleman, for improvements in weighing machines.—Sealed 3rd September—6 months for inrolment.

William Daubney Holmes, of Cannon-row, Westminster, civil engineer, for certain improvements in naval architecture, and apparatus connected therewith, affording increased security from foundering and shipwreck.—Sealed 3rd September—6 months for inrolment.

Thomas Horne, of Birmingham, brass-founder, for improvements in the manufacture of hinges.—Sealed 3rd September—6 months for inrolment.

James Bingham, of Sheffield, manufacturer, for certain improved compositions, which are made to resemble ivory, bone, mother-of-pearl, and other substances applicable to the manufacture of handles of knives, forks, and razors, piano-forte keys, snuff boxes, and various other articles.—Sealed 3rd September—6 months for inrolment.

William Freeman, of Mill-bank-street, Middlesex, stone merchant, for improvements in paving or covering roads, and other ways or surfaces,—being a communication.—Sealed 7th September—6 months for inrolment.

Thomas Motley, of Bath Villa, Bristol, engineer, for improvements in apparatus and means of burning concrete fatty matters.—Sealed 7th September—6 months for inrolment.

William Coltman, of Leicester, frame-smith, and Joseph Vale, of the same place, frame-smith, for improvements in machinery employed in frame-work, knitting, or stocking fabrics.—Sealed 7th September—6 months for inrolment.

Samuel Parker, of Piccadilly, manufacturer, for improvements in apparatus for preserving and purifying oils, and in apparatus for burning oils, tallow, and gas.—Sealed 10th September—6 months for inrolment.

Paul Hammic, of Clements-lane, London, solicitor, for improvements in the construction of governors or regulators applicable to steam-engines, and to other engines used for obtaining motive power,—being a communication.—Sealed 10th September—6 months for inrolment.

Charles Delbruck, of Oxford-street, gentleman, for improvements in apparatus for applying combustible gas to the purposes of heat,—being a communication.—Sealed 10th September—6 months for inrolment.

Edward John Dent, of the Strand, chronometer maker, for certain improvements in clocks, and other time-keepers. —Sealed 10th September—6 months for inrolment.

Henry Houldsworth, of Manchester, cotton spinner, for improvements in carriages used for the conveyance of passengers on railways, and an improved seat, applicable to such carriages and other purposes.—Sealed 10th September—6 months for inrolment.

Hugh Lee Pattinson, of Bensham-grove, Durham, manufacturing chemist, for improvements in the manufacture of white lead.—Sealed 10th September—6 months for inrolment.

George Alexander Gilbert, of Southampton-buildings, Middlesex, for certain improvements in machinery or apparatus for obtaining and applying motive power.—Sealed 10th September—6 months for inrolment.

Robert Goodacre, of Ullesthorpe, Leicester, for an apparatus for raising heavy loads in carts, or other receptacles containing the said loads, when it is required that the unloading should take place at any considerable elevation above the ground.—Sealed 10th September—6 months for inrolment.

James Pilbrow, of Tottenham-court-road, engineer, for certain improvements in steam-engines.—Sealed 10th September—6 months for inrolment.

William Bedford, of Hinckley, Leicestershire, frame-work knitter, for certain improvements in machinery employed in manufacturing hosiery goods, or what is commonly called frame-work knitting.—Sealed 17th September—6 months for inrolment.

Henry Fourdrinier, and Edward Newman Fourdrinier, both of Hanley, Stafford, paper makers, for certain improvements in steam-engines for actuating machinery, and in apparatus for propelling ships and other vessels on water. —Sealed 17th September—6 months for inrolment.

Moses Poole, of Lincoln's-inn, gentleman, for improvements in preparing materials to facilitate the teaching of writing,—being a communication.—Sealed 17th September—6 months for inrolment.

Walter Richardson, of Regent-street, gentleman, and George Mott Braithwaite, of Manor-street, Chelsea, gentleman, for improvements in turning metals,—being a communication.—Sealed 17th September—6 months for inrolment.

Samuel Draper, of Nottingham, lace manufacturer, for improvements in the manufacture of ornamented twist, lace, and looped fabrics. — Sealed 21st September — 6 months for inrolment.

William Mill, of Blackfriars-road, engineer, for certain improvements in propellers, and in steam-engines, and in the method of ascertaining and measuring steam power; parts of which improvements are applicable to other useful purposes.—Sealed 21st September—6 months for inrolment.

Charles Handford, of High Holborn, tea-dealer, for an improved edible vegetable preparation, called "Eupooi," and the mode of manufacturing the same.—Sealed 21st September—6 months for inrolment.

Thomas Pain, junior, of 57, Upper Seymour-street, Euston-square, student-at-law, for a plan, by means of which carriages may be propelled by atmospheric pressure only, without the assistance of any other power,—being an improvement upon the atmospheric railway now in use.—Sealed 22nd September—6 months for inrolment.

John Maughan, of Connaught-terrace, Edgeware-road, gentleman, for certain improvements in the construction of wheeled carriages.—Sealed 24th September—6 months for inrolment.

George Goodman, of Henley, in Arden, and of Birmingham, needle manufacturer, for certain improvements in the manufacture of mourning and other dress pins.—Sealed 24th September—6 months for inrolment.

John Gibson, and Thomas Muir, both of Glasgow, silk manufacturers, for improvements in cleaning silk and other fibrous substances.—Sealed 24th September—6 months for inrolment.

William Hirst, of Leeds, clothier, for improvements in the manufacture of woollen cloth, and cloth made from wool and other materials.—Sealed 24th September—6 months for inrolment.

Pierre Erard, of Great Marlborough-street, Middlesex, for improvements in piano-fortes.—Sealed 24th September—6 months for inrolment.

Henry Pinkus, of Panton-square, Coventry-street, Middlesex, Esq., for improvements in the methods of applying motive power to the impelling of machinery applicable, amongst other things, to impelling carriages on railways, on common roads or ways, and through fields, and vessels afloat; and in the method of constructing the roads or ways on which carriages may be impelled or propelled.—Sealed 24th September—6 months for inrolment.

John Johnston, of Glasgow, gentleman, for a new method (by means of machinery) of ascertaining the velocity of, or the space passed through by ships, vessels, carriages, and other means of locomotion, part of which is also applicable to measurement of time.—Sealed 24th September—6 months for inrolment.

Thomas Robinson Williams, of Cheapside, gentleman, for improvements in the manufacture of woollen fabrics, or fabrics of which wools, furs, or hairs, are the principal components, as well as for the machinery used therein.—Sealed 24th September—6 months for inrolment.

Alexander Dean and Evan Evans, of Birmingham, millwrights, for certain improvements in mills for reducing grains and other substances to a pulverised state, and in the apparatus for dressing or bolting pulverised substances.—Sealed 24th September—6 months for inrolment.

CELESTIAL PHENOMENA FOR OCTOBER, 1840.

D. H.
1 Clock after the sun, 10m. 25s.
-- ☽ rises 0h. 55m. A.
-- ☽ passes mer. 4h. 16m. A.
-- ☽ sets 7h. 36m. A.
6 22 ♄ in conj. with the ☽ diff. of dec. 6. 4. N.
13 30 Vesta in conj. with ♄ diff. of dec. 1 2. S.
2 Occul Sagittarii, im. 7h. 39m. em 8h. 48m..
3 5 38 ☽ in □ or first quarter.
5 Clock after the sun, 11m. 39s.
-- ☽ rises 3h. 28m. A.
-- ☽ passes mer. 7h. 36m. A.
-- ☽ sets 11h. 52m. A.
6 14 24 Vesta in the descending node.
8 16 3 Her: in conj. with the ☽ diff. of dec. 2. 58. S.
9 9 15 ☿ in the descending node.
10 Clock after the sun, 13m. 2s.
-- ☽ rises 4h. 39m. A.
-- ☽ passes mer. 11h. 25m. A.
-- ☽ sets 5h. 6m. M.
11 7 14 Ecliptic oppo. or ○ full moon
12 Occul μ in Arietis im. 10h. 50m. em. 11h. 9m.
13 Occul *g* in Pleiadium im. 11h. 13m. em. 12h. 32m.
- Occul *e* in Pleiadium im. 11h. 25m. em. 12h. 32m.
- Occul *c* in Pleiadium im 11h. 43m. em. 12h. 37m.
14 39 Ceres in □ with the ☉
15 Clock after the sun, 14h. 13m.
- ☽ rises 7h. 11m. A.
- ☽ passes mer. 3h. 12m. M.
- ☽ sets 0h. 16m. A.
4 41 ♀ in the descending node.
17 11 58 ☽ in □ or last quarter
— Occul C. Tauri im. 11h. 5m.
19 Mercury R. A. 14h. 32m. dec. 16. 6. S.
- Venus R.A. 15h. 6m. dec. 17. 39 S.
- Mars R. A. 10h. 30m. dec. 15. 56. N.

D. H. M.
— Vesta R. A. 17h. 36m. dec. 23. 46. S.
— Juno R.A. 10h. 52m. dec. 2. 42. N
— Pallas R. A. 18h. 40m. dec. 4. 56. N.
— Ceres R. A. 19h. 43m. dec. 30. 7. S.
— Jupiter R. A. 15h. 20m. dec. 17. 37. S.
— Saturn R. A. 17h. 8m. dec. 21. 45. S.
— Georg. R. A. 23h. 13m. dec. 5. 51. S.
— Mercury passes mer. 0h. 49m.
— Venus passes mer. 1h. 42m.
— Mars passes mer. 20h. 37m.
— Jupiter passes mer. 1h. 28m.
— Saturn passes mer. 3h. 15m.
12 39 ☿ in Aphelion.
20 Clock after the sun, 15m. 10s.
— ☽ rises, 0h. 34m. M.
— ☽ passes mer. 8h. 0m. M.
— ☽ sets 3h. 7m. A.
14 9 ♂ in conj. with the ☽ diff. of dec. 2. 40. N.
— Occul ζ Sextantis, im. 14h. 59m. em. 15. 47.
22 8 34 ♀ in conj. with the ♃ diff. of dec. 1. 6. S.
25 Clock after the sun, 15m. 51s.
— ☽ rises 7h. 2m. M.
— ☽ passes mer. 11h. 43m. M.
— ☽ sets 4h. 12m. A.
8 58 Ecliptic conj. or ● new moon
26 13 8 ☿ in conj. with the ☽ diff of dec. 3. 16. N.
18 23 ♃ in conj. with the ☽ diff. of dec. 5. 57. N
27 3 53 ♀ in conj. with the ☽ diff. of dec. 4. 34. N.
28 18 18 ♄ in conj. with the ☽ diff. of dec. 5. 43. N.
19 30 ☿ in conj. with ♃ diff. of dec. 2. 53. S.

The Eclipses of the Satellites of Jupiter are not visible until the 16th day of December, Jupiter being too near the Sun.

J. LEWTHWAITE, Rotherhithe.

THE

London

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OF

Arts, Sciences, and Manufactures.

CONJOINED SERIES.

No. CVI.

Recent Patents.

To John Gottlieb Ulrich, *late of Nicholas-lane, in the city of London, but now of Red Lion-street, in the parish of St. Mary, Whitechapel, and county of Middlesex, chronometer maker, for his invention of certain improvements in chronometers.*—[Sealed 22nd April, 1837.]

My improvements in chronometers apply to several constructions of instruments for measuring time, and have for their object,—first, a mode of ensuring a continued action of the balance of a chronometer, by means of improved escapements or mechanism, which prevent the liability of the works being brought to rest by any sudden shock, or circular motion of the instrument in the plane of the balance; which are effected by means of novel constructions of detents; second, self-acting regulators, or modes of com-

pensating for the expansion and contraction of the balance spring, under variations of temperature; which also afford the means of employing a material for the balance, that will not be subject to magnetic influence; and also a mode of adjusting the compensating parts of the pendulum of an astronomical time-keeper; third, an improved mechanism for stopping the hands of a watch, without interrupting the action; fourth, a new mode of locking and unlocking the striking parts of such chronometers as report the time; fifth, a mechanism for discharging the striking parts of an alarum or warning watch; and sixth, a mode of preventing the oxidation of the springs of chronometers, by covering them with a thin coat of some metal, which is not liable to become oxidated.

These improvements will be made evident by the following explanations and descriptions of the details of the several heads above mentioned, (reference being had to Plate VIII.); that is to say,—fig. 1, is a plan or horizontal representation of one of my improved escapements; fig. 2, is another representation of the same, the parts being in different positions to those in fig. 1; and fig. 3, is an elevation or edge view of the same. The escapement wheel is shewn at *a, a, a,* having a series of elevated teeth 1, 2, 3, &c., which act upon the detent pallet. The balance *b, b,* is fixed on the axle *c,* which axle also carries the impulse pallet *d,* the discharging pallet *e,* and the circular guard *f, f.* The balance spring *g,* is attached to the pendulum collet, at one end, and to the stud at the other, in the usual way.

The spring detent *h, h,* fixed into the stud *i,* carries the ruby pallet *k,* which pallet, by coming in contact with the teeth 1, 2, 3, &c., of the escape wheel, stops the rotation of the escape wheel between each impulse. Another pallet *l,* intended as an auxiliary to the spring detent, is also

attached thereto by means of a small bent arm *m*, which arm, when the detent escapes from the discharging pallet, comes against the banking screw *n*, in the end of a piece *o*, extending from the cock of the escape wheel. The end of the detent has a right angle arm *p*, which carries the repassing spring *q*. From the end of the detent there is also a crooked arm *r*, extending, which carries a small guard pin at its extremity. This pin is designed in the event of any sudden jerk being given to the instrument, to come against the periphery of the circular guard *f*, and thereby preventing the detent pallet *k*, from being thrown out of the teeth of the escape wheel.

Having described the construction of one modification of my improved escapement, I now proceed to explain the manner in which it operates:—

Fig. 1, shews the positions of the parts of the escapement when in a state of rest; the point of the tooth 5, of the escape wheel bearing against the detent pallet *k*. The balance being now made to move round a very short distance backward, (say about 4 degrees,) the discharging pallet *c*, will pass the end of the repassing spring *q*, and in so doing, the balance spring *g*, will be put into a slight degree of tension. The balance will, by these means, be now disposed to return in the opposite direction; and in so returning, will strike against the end of the repassing spring *q*, and force the spring detent forward; by which means the pallet *k*, of the detent, will be withdrawn from the tooth 5, and the escape wheel be allowed to move onward.

By this returning movement of the balance, the impulse pallet *d*, will be brought into the circular orbit of the teeth of the escape wheel; and the tooth 7, will now act against the impulse pallet *d*, and as it passes through the angle of escapement, (as shewn by dots,) will impel the balance on-

ward, and put the balance spring into a state of considerable tension.

The tooth 7, now escaping from the impulse pallet *d*, the tooth 6, will, by the movement of the escape wheel, be brought into the former situation of the tooth 5, bearing against the pallet *k*, and there remain until the balance, by returning, repeats the same evolutions. In this way, the subsequent teeth of the escape wheel come, successively, into operation upon the pallet, at equal intervals of time, and so regulate the movements of the chronometer.

In the event of the detent not returning to its banking *n*, in sufficient time to catch the point of the tooth of the escape wheel, the internal surface of the tooth would come in contact with the auxiliary pallet *l*, on the spring detent; by which means the progress of the escape wheel would be arrested, and the pallet, by gliding along the inclined surface, at the back of the tooth, would cause the detent to be drawn into the proper situation for the pallet *k*, to receive the end of the tooth, as required.

In order to prevent the pallet *k*, upon the spring detent, being thrown out of the teeth of the escape wheel, at any other time, except when the impulse pallet *d*, is acted upon, the guard pin, at the end of the bent arm *r*, is so situated as to come against the periphery of the circular guard *f*, which, consequently, retains the detent in its proper position.

Fig. 4, is a separate view of these parts in the position in which this guard pin might come into operation.

Fig. 5, represents a modification of the before described escapement, in which two spring detents are employed, acting alternately upon the escape wheel. The escape wheel *a, a, a*, has two sets of teeth;—those on the face of the wheel 1, 2, 3, &c., thirty in number, being shaped as the upper part of a gothic arch, placed sideways, act upon

the impulse pallet; those on the under surface 1,* 2,* 3,* &c., fifteen in number, (shewn by dots,) as oblique wedges, placed at angles, between the radius and the tangent, act upon the detent pallets.

The axle of the balance is shewn at *b*, on which is fixed two discharging pallets *c*, and *d*; two circular guards, as before described; and the impulse pallet *f*. The spring detents *g*, and *h*, are fixed in studs, one on each side of the escape wheel, tending toward the axis of the balance, and carrying each a detent pallet *i*, and *k*.

These spring detents are partially shewn above, at figs. 6 and 7, removed from the instrument, for the purpose of exhibiting them more distinctly.

The impulse pallet *f*, being supposed to be moving in the direction of the small arrow, the discharging pallet *c*, will raise the detent *g*, and lift the pallet *i*, out of the teeth of the escape wheel. At this moment, the inner curved surface of the tooth 6, is beginning to act upon the outer curved surface of the impulse pallet *f*, pushing the pallet, and consequently the balance, round in the direction of the small arrow, which brings the balance spring into tension; and when the impulse pallet has passed away from the tooth 6, the escape wheel *a*, proceeds in its rotation, until it is arrested by the oblique tooth 3,* coming in contact with the pallet *k*, on the detent *h*; the impulse pallet passing on through the space between the gothic-shaped teeth 2 and 3, which will then be opposite to the course of the pallet *f*.

From the state of tension which the balance spring has now acquired, the balance will be induced to return, carrying the impulse pallet, in the direction opposite to that of the small arrow, through the space between the teeth 2 and 3; and when it arrives at the space between the teeth

6 and 7, the discharging pallet *d*, will come in contact with the repassing spring of the detent *h*, and lift the detent, so as to draw the pallet *k*, away from the tooth 3.*

The escape wheel proceeding in its rotation, the outer curved surface of the tooth 7, will act against the inner surface of the impulse pallet *f*, and push it onward in the direction opposite to the small arrow; and thus the balance spring being again brought into a state of tension, the balance, with the impulse pallet, will return in the direction of the small arrow, and perform the evolutions, as described above.

Fig. 8, represents a slight modification of the last described mechanism, in which the only difference is in the position of the impulse pallet.

Another modification of my improved escapement is shewn at fig. 9, in which a pivot detent is employed for arresting the rotation of the escape wheel, in place of the spring detents above described, in reference to fig. 5.—This fig. 9, represents the upper surface of the escape wheel *a*, *a*, *a*, having a series of thirty gothic teeth, as before, upon its face; and a similar number of segment-formed teeth, placed sideways, on its under surface, (as shewn by dots); but which under surface of the escape wheel is more perfectly seen at fig. 10; and an elevation or edge view of fig. 3, is represented at fig. 11.

The detent *b*, screwed on to the discharging piece *c*, is formed by two arms, each carrying a ruby pallet *d*, and *e*, which together move upon the axle *f*. The end of the discharging piece *c*, is formed as a fork, shewn more evidently in the separate figure 12; and this forked end of the discharging piece is acted upon by two pins, in the face of the disc *g*, fixed on the balance axis *h*.

Upon the balance axis is also fixed the impulse pallet *i*,

which is acted upon, by the upper circle of teeth on the face of the escape wheel, exactly in the same way as described in reference to fig. 5.

These figures represent the escapement in a state of rest, both the pallets *d*, and *e*, of the detent, at this moment standing free from the circle of teeth 1,* 2,* 3,* &c., on the under surface of the escape wheel; the escape wheel is therefore allowed to proceed in its rotary motion in the direction of the arrow; and, in so doing, the outer surface of the tooth 3, will act upon the inner surface of the impulse pallet *i*, forcing it and the balance round, (as in fig. 5,) in the direction of the arrow, shewn in the partial representation of the escapement, at fig. 13; and by so moving the balance axle, one of the pins in the disc *g*, acting upon the fork of the piece *c*, will cause the pivot detent to bring the pallet *d*, behind the segment tooth 3,* into a situation ready to arrest the progress of the escape wheel, by stopping the tooth 4,* when it arrives.—By these means, the balance spring will be brought into a state of tension, which will cause the balance, with the impulse pallet *i*, and disc *g*, to return in the direction opposite to the arrow in fig. 13; and in so moving, the pin in the disc *g*, will come in contact with the forked end of the piece *c*, and shift the pivot detent so as to withdraw the pallet *d*, from the tooth 4,* and bring the pallet *e*, behind that tooth, ready to arrest the progress of the escape wheel, by stopping the tooth 5,* when it arrives; thus the action of the escapement is effected at regular intervals of time.

The banking pins confine the extent of action of the pivot detent; but a small pin, in the end of the piece *c*, intended to fall into a notch in the periphery of the disc *g*, prevents the detent from shifting its position, except at the moment when the two pins, in the disc, enter the fork.

Fig. 14, represents a slight variation from, or modification of, the last described escapement, in which two series

of small wedge-formed teeth are placed in inclined positions round the under surface of the escape wheel, as shewn by dots.

In order to correspond with the positions of the two circles of inclined teeth, the detent pallets *d*, and *e*, are fixed in angular positions in the arms of the detent. Fig. 14, represents the escapement in a state of rest; and fig. 15, (which gives but a partial view of the escape wheel,) represents the escapement in a state of motion.

Fig. 16, is another modification of the plan proposed in fig. 5, in which the detent pallets are differently situated; but all the other parts are the same as before described.

It is scarcely necessary for me to say, in closing this description of my improved escapements, that the parts or principles of construction and action, thus set out, are susceptible of still more variations or modifications.

My first mode of compensating for the expansion and contraction of the balance spring of a chronometer, under variations of temperature, is represented at fig. 17, in a plan or horizontal view; and at fig. 18, in an elevation or edge view. In these figures *a*, *a*, is a brass plate, to be attached to the upper plate of the instrument; *b*, *b*, are two long bars, called pendulum studs, each bearing a spring at its stationary end. To the reverse end of each of these studs, the outer extremity of one of the two balance springs *c*, and *d*, is attached,—the inner extremities of these springs being made fast to two collets on the balance axle.

A straight plate of platina *e*, *e*, is affixed by screws to an adjustable sliding piece *f*, mounted on the plate *a*. Upon the platina plate two brass tubes *g*, *g*, are mounted, the outer ends of which are made fast to the plate; but the inner ends of the tubes are attached to the long bar pendulum studs *b*, *b*.

When the temperature of the atmosphere, by an in-

crease of heat, causes the tension of the balance spring to relax, owing to the expansion of the metal, the brass tubes *g*, *g*, by expanding also, cause the ends of the pendulum studs to approach each other, thereby drawing the springs into tension; and, of course, when the heat becomes reduced, the brass tubes, by contracting, will draw the pendulum studs farther apart, and thereby partially uncoil the balance springs.

Another mode of compensating for the expansion and contraction of the balance spring, under variations of temperature, is shewn in fig. 19. *a*, *a*, is the brass plate, carrying the compensating apparatus. The balance spring is shewn at *b*, one end of which is attached to a flexible arm or stud *c*, the other end to the collet on the balance axle, as usual.

A brass frame *d*, *d*, placed upon an adjustable slide, carries two steel or platina rods *e*, *e*, attached by joints, and connected in the middle. From the junction of these rods a connecting rod *f*, passes up to a spring lever *g*; the acting end of which lever is attached to a pair of lever arms *h*, *h*, which carry the axles of two rollers *i*, *i*. Springs *j*, *j*, act at the backs of these lever arms, for the purpose of pressing the peripheries of the rollers *i*, *i*, together, or rather to cause them to take tight hold of the flexible arm or stud *c*.

In the event of the brass frame *d*, *d*, expanding, the force of the spring lever *g*, draws up the jointed rods *e*, *e*, and raises the arms *h*, *h*, and rollers *i*, *i*, so as to cause the periphery of the rollers to pinch the flexible arm or stud *c*, higher up, by which means the tension of the spring *b*, becomes increased. When the frame *d*, contracts by cold, the reverse operation takes place, and the spring *b*, becomes relaxed. A small piece of metal *k*, is fixed upon the brass plate, against the edge of which one of the rollers acts,

for the purpose of steadying them, and confining the position of the spring arm *c*. The adaptation of these modes of compensating for the expansion and contraction of the balance spring, allow of the employment of such materials for the balance as are not subject to magnetic influence, viz.—platina, palladium, glass, &c.

Fig. 20, represents part of a compensation pendulum of an astronomical time-keeper, the pendulum being shewn in section. *a*, is a small escape wheel, with teeth, as in fig. 14, intended to be actuated by clock-work behind. At the lower end of the pendulum, (which is to vibrate only about the distance of an eighth of an inch,) a small impulse pallet *b*, is fixed, and a forked pivot detent *c*, with a pin and pallets are adapted, as shewn in figs. 14 and 15, described above; which contrivance is designed to keep up the vibrating action of the pendulum.

The mode of adjusting the compensation of this pendulum is by means of a double screw *d*, *d*, formed on the internal and external surface at the end of the nut *e*, *e*, which passes into the compensation tubes, and on the outside of the compensation tube a clip, with a thumb-screw *f*, is applied, for the purpose of binding the tube tight upon the nut *e*.

My improved mechanism for stopping the hands of a watch, without interrupting the going of the works, is shewn at fig. 21. *a*, is the seconds wheel, turning loosely upon its axle; *b*, is a coiled spring, attached to an arm *c*, fixed on the seconds wheel axle; the other end of this spring is attached to a stud, extending from the inner part of the seconds wheel; *d*, is a spring arm, having a tooth at its end, which is occasionally allowed to fall into the teeth in the seconds wheel for the purpose of stopping its rotation. When this stoppage of the seconds wheel takes place, the seconds hand, which is upon the collar or shoulder

of the wheel, stops also; but the axle continues revolving, winding the spring *b*, up to tension; and when the axle has revolved for the space of one minute, the tail of the arm *c*, coming in contact with an inclined plane at the end of a spring lever *e*, causes that lever to rise and to lift the tooth of the arm *d*, out of the ratchet teeth of the seconds wheel, and release it.

The tension of the spring *b*, now causes the seconds wheel to fly round and to recover its proper position, which is determined by the point of the arm *c*, stopping against the stud *f*.

The minute wheel *g*, situate in the centre of the plate, is mounted in a similar way to the seconds wheel, having a coiled spring and a detaining arm *h*, with a tooth at its end, taking into the ratchet teeth of the minute wheel.

The mechanism by which these wheels are stopped, for the purpose of holding the seconds and minute hands, is connected with the pendant *i*, fixed in the socket *j*;—a sliding piece, within the pendant, acts upon a long curved lever, *k*, *l*, which has its fulcrum pin fixed in the plate at *m*; and a bent tail-piece *n*, extending from this lever, acts upon the longer arm *o*, of a double lever *o*, *t*, fixed upon a disc *p*. To this disc *p*, is attached the arm *d*, with the tooth taking into the seconds wheel; and to the same disc is also attached an arm *q*, with an adjusting screw *r*, which forms the banking for the spring lever *e*. A strong spring *s*, presses against the tail *t*, of the double lever, for the purpose of raising the longer arm *o*, of that lever, and keeping the tooth of the arm *d*, out of the seconds wheel.

When it is required to stop the hands of the watch, the pin in the pendant is to be pressed inward, which will act upon the lever *k*, *l*, and cause the bent tail-piece *r*, to depress the arm *s*, and also the arm *d*, thereby throwing the tooth of the arm *d*, into the ratchet teeth of the se-

conds wheel, for the purpose of stopping its rotation, as before said. At the same time the arm *l*, of the long bent lever, will be made to act upon the tail-piece of the arm *h*, and cause the tooth of that arm to be thrown into the ratchet teeth of the minute wheel *g*, and stop its rotation. As long therefore as the pin in the pendant is pressed inwards, the seconds and minute wheels will remain locked, excepting during the escapement of the seconds wheel, every minute, as described above; but the moment that the pressure is taken off the push pin, the force of springs *s*, *v*, and *u*, will throw all the levers back, out of action.

When the retaining force is thrown upon the seconds and minute wheels, as described, it will be necessary to put in action a spring that shall be equivalent to the retaining force. This is done by means of a double action spring lever *w*, which is thrown into tension by the depression of the arm *k*, causing the catch *x*, to take into the teeth of the fusee wheel *y*.

The mechanism for locking and unlocking the striking parts of such chronometers as report the time, is shewn at fig. 22. The wheel which carries the minute hand is shewn at *a*, taking into a corresponding wheel *b*, into which is inserted a pin *c*, intended, as it revolves, to raise the lever *d*. To this lever is attached the double armed lever *e*, *f*, both turning freely upon a stud *g*, fixed in the plate.

A detent lever *h*, hangs upon a stud at *i*, the extremity of which lever bears upon the end of the arm *e*; and a tooth at the under part of this lever, takes into a curved rack *k*, forming part of a lever *l*, which turns upon a stud *m*, fixed in the plate. A fly *n*, fixed upon the last pinion of the striking work, is stopped by the end of one arm of a double lever *o*, *p*, which lever turns upon a fixed stud *q*; the other arm *p*, of this lever, has a tooth taking

into a notch in a disc *r*, upon the arbour of the tumbler wheel. A pin in the arm *p*, rests against the end of the longer arm of a lever *s*, which is held up by its tail bearing upon the end of the curved rack *k*; and this curved rack, with its lever *l*, is confined in the position shewn in the figure by the tooth under the lever *h*, standing before the last tooth in the rack.

As the wheel *b*, revolves, the pin *c*, is made to raise the lever *d*, every hour as it passes, and in so doing causes the lever *e*, to lift the lever *h*, and release the rack *k*, from the detaining tooth.—The rack *k*, is then carried forward in the direction of the arrow, by the force of the spring *t*, acting upon the tail-piece of the lever *l*, which raises the shorter arm of the lever *l*, and throws a pin near its end, against the periphery of the snail *v*, fixed upon the star wheel *u*.

The receding of the rack now allows the shorter arm of the lever *s*, to be pressed down by its spring *w*,—and the longer arm of the lever *s*, to raise the arm *p*, of the double lever *p*, *o*, and lift its tooth out of the notch of the disc *r*; at the same time the other arm *o*, of this lever, being raised, allows the fly *n*, to revolve. The fly *n*, is thus permitted to pass round in the direction of the arrow, giving warning, until a pin near its end catches against the hook *x*, at the end of the now elevated arm *f*, of the double lever *e*, *f*, which arrests its progress until the pin *c*, in the minute wheel *b*, has escaped from the tail of the arm *d*, when the levers *d*, *e*, *f*, and *h*, are allowed to fall into their former positions. The fly being now at liberty, revolves freely, and allows the disc *z*, with the tumbler or gathering pallet *y*, to revolve also, by means of the well-known train of wheels not shewn in the figures. The gathering pallet *y*, as it goes round, takes successively into the teeth of the rack *k*, and thereby forces the rack back into its former position; when the tail of the lever *s*, again ascends on to

the end of the rack, and the levers *p*, and *o*, fall, the one bringing its tooth into the notch of the disc *e*, the other stopping the rotation of the fly.

The mechanism for discharging the striking parts of an alarum watch is shewn at figs. 2, 3, and 2, 4. *a*, is a disc, placed upon the axle of the minute pinion; *b*, a similar disc, upon the socket of the hour wheel. These discs are not absolutely fixed, but fit tightly; *c*, *d*, is a double armed lever, upon a fulcrum *e*, acted upon by a spring *f*. At the outer end of the lever *c*, there is a catch, intended to arrest the rotary action of the fly *g*. Fig. 23, exhibits this improved mechanism when the alarum is in a quiescent state; but, as the ordinary works of the watch go on, the discs *a*, and *b*, come round into such positions as will allow the teeth on the levers *c*, and *d*, to fall into the notches of the discs *a*, and *b*, as seen in fig. 24, which liberates the fly, and allows the alarum to go off. The alarum is set by turning the discs round, until an index, upon each, comes opposite to the hour or minute marked on the dial-plate, at which the alarum is required to be discharged.

My mode of preventing the oxidation of the metal composing the springs of chronometers, by covering them with a thin coat of some metal which is not liable to oxidation, is effected by dipping the metal, after its form is finished and its surface polished, into an etherial solution of gold, platina, or palladium; then instantly withdrawing it from the solution, and plunging it immediately into cold water, which will cause a deposit of the metal in the solution to remain on the surface of the articles so treated, and leave them perfectly plated, and defended from the action of the atmosphere.—[*Inrolled in the Rolls Chapel Office, October*, 1837.

Specification drawn by Messrs. Newton and Berry.

To JAMES SUTCLIFFE, *of Henry-street, Limerick, builder, for certain improvements in machinery or apparatus for raising and forcing water or other fluids, and increasing the power of water upon water wheels and other machinery.*—[Sealed 24th October, 1839.]

THE patentee describes his invention in the following words:—My improvements in machinery or apparatus for raising and forcing water or other fluids, and increasing the power of water upon water wheels and other machinery, consist, first, in the construction of a rotary engine or pump, in which, by the revolutions of an elliptical piston, within a cylindrical chamber, water is made to ascend through a rising main, and curved channel into the cylinder, and from thence is forced, by the rotary action of the piston, into a receptacle above, from whence it is discharged at a lateral aperture, and is conducted off by a pipe.

In Plate IX., fig. 1, represents a section, taken vertically through the machine, shewing the cylinder, the piston, the rising main, the curved channel, the valve, and the receptacle above, with its discharge pipe; fig. 2, is also a section, taken vertically through the machine, at right angles to the former,—that is, in the direction of, and through the axis of the piston; figs. 3, and 4, are external views or elevations of the machine, taken in the positions of the two last figures; similar letters indicating the same parts in all these figures.

The cylinder is shewn at *e*, *e*, *e*, supported by its flange and bearings *n*, *n*, which rest upon beams of timber *o*, *o*. The ends of the cylinder are closed by cap-plates *g*, *g*, screwed or bolted to lugs on the outside. Within the cylinder is the elliptical piston *b*, *b*, *b*, the external diameter of which, taken through the transverse axis,

exactly fits the internal diameter of the cylinder, against which it works, forming water-tight junctions. The sides or ends of the elliptical piston are closed by disc plates *c, c, c,* which extend to, and exactly fit the internal periphery of the cylinder; and the discs are attached to the elliptical piston, and held fast together by screw bolts *d, d.* These disc plates *c, c,* with the elliptical piston, are fixed upon a shaft *f*, turning in packed bearings *h, h,* extending from the cap-plates *g, g.*

Rotary motion is given to the piston by winches placed upon the ends of the shaft *f*, by which those parts of the periphery of the piston, that are at the extremities of the transverse axis of the ellipsis, pass round in close and water-tight contact with the interior of the cylinder. Contiguous to the cylinder is a segmental tube or passage *k, k,* leading from the supply pipe or rising main *l*, below, and opening above into the cylindrical chamber *e, e, e*; and there is a lever valve or tongue *a*, working upon a hinge joint in the tank *i*, above; which, by its gravity, is kept down, its lower edge always acting against the periphery of the elliptical piston, as a stop to the passage of the water between them.

The piston being made to revolve within the cylindrical chamber in the direction of the arrow, seen near *f*, in fig. 1,—an exhaustion of the air or partial vacuum will be produced in that portion of the cylindrical chamber, which is between the receding part of the piston and the valve *a*. This action of the piston will, consequently, cause the air to be pumped or drawn from the segmental passage *k*, and pipe *l*, through the opening which communicates with the cylinder, when the water will immediately flow up the pipe *l*, and tube *k*, into that part of the cylindrical chamber which has been so exhausted. The rotation of the piston will hence cause the water, so brought in, to occupy the lower

part of the cylindrical chamber, and as the piston proceeds, the whole volume of water, occupying the lower part of the cylinder, will be forced upwards, and discharged above the valve *a*, through an opening in the top of the cylinder into the tank *i*, and then run off through the pipe *m*; the course which the water takes in passing through the machine being indicated by arrows in the section, fig. 1.

Having described the construction of my improved pump, and its mode of operation, I desire it to be understood, that I claim, particularly under this first head of my improvements, the elliptical piston, acting within a cylindrical chamber, in connection with a moveable tongue or valve, the edge of which, by continually working against the periphery of the piston, forms a water-tight stop. I would also observe, that any variation in the form of a piston, if employed for the purpose, and in the way or in connection with the cylinder, and valve above described, I should consider to be an imitation of my invention.

The advantages obtained by this construction of pump are, first, that the movement of the piston being rotary, there will be no loss of time or labour as in reciprocating pistons, and a continuous flow of water will be obtained; second, that the opening and closing of valves is dispensed with, and no packing at the joints required; third, the working parts being entirely of metal, are not liable to get out of order, and will experience but a very small degree of friction; fourth, that the operations of raising and forcing the water, are effected by one continuous action; and fifth, that the pump is not liable to choke from the passage of pieces of wood or other hard substance into it, as the discharge of any such material would not be obstructed by contracted passages or valves. If it is desired to construct this improved pump, so as to be

capable of being used as a fire-engine, this can readily be accomplished by placing a stop-cock on the exit aperture *m*, and applying an air chamber *p*, to the tank *i*, as shewn by dots, in fig. 1; and also a hose or flexible pipe *q*, with a proper metal mouth-piece *r*, also to be furnished with a stop-cock, in order that the pump may, at other times, be used for ordinary purposes.

The second head of my invention is an apparatus, by which water may be raised from a reservoir, cistern, or butt below, to an elevation considerably above the level of that in the reservoir, without employing any mechanical force, beside the pressure of the water in the reservoir.

Fig. 5, in the accompanying drawings, represents the apparatus in section, supposed to be taken vertically through the middle of a water butt, and through the apparatus connected thereto.

The butt is shewn at *b*, filled with water, from the lower part of which, a pipe with a tap *h*, leads to the lower part of an upright cylindrical vessel *c, c, c*. At the upper part of this vessel, a flexible diaphragm or bag *a, a*, is attached; and a dome cap, affixed upon the cylinder, having a pipe *f*, at its top, holds fast the edges of the diaphragm or bag. Beneath the diaphragm, within the cylinder *c, c*, an air vessel *d, d*, is placed, which is designed to float upon the water, occupying the lower part of the cylinder.

On opening the tap *g*, water will flow from the butt into the bag *a, a*, until that and the dome have become completely filled; the tap *g*, must then be turned, so as to shut off the communication or flow of the water; and the tap *h*, being then opened, water will flow into the lower part of the cylinder *c, c*. As the water rises in the lower part of the cylinder, the air vessel *d, d*, will float, and

ascend to the top of the cylinder, forcing up the diaphragm or bag, and thereby expressing that volume of water, contained between the diaphragm and the dome, through the pipe *f*; by which means it is made to rise up into any suitable receiver above.—When this has been done, the tap *h*, must be closed, and the tap *i*, opened, in order to allow the water to discharge itself from the lower part of the cylinder, by which the water will be supplied from the cylinder, and the air vessel *d*, *d*, will be made to descend. The tap *i*, being then closed, the tap *g*, must be opened again, and the water be allowed to flow into the bag and dome as before,—when the operation being repeated, as described, a second volume of water will, in like manner, be forced through the pipe *f*, and so on, as long as the level of the water in the butt or reservoir *b*, can be kept up above the top of the dome.

By these means, whenever a plentiful supply of water can be afforded, to keep up the level in the reservoir, a considerable quantity may be raised to a higher level, without any other labour than that of opening and closing of the taps, at the proper periods; and this might perhaps be effected by mechanism, so as to render the whole self-acting. I wish, therefore, to observe, that I claim, in reference to this second head of my invention, the flexible bag to receive the water, and the floating air vessel or buoy; by the raising of which, the water is expressed through a pipe or tube above.

The third head of my improvements, is a mode of increasing the power of water upon water-wheels, which consists in the peculiar construction of the buckets or vessels which receive the water on the periphery of an over-shot water-wheel, working them in close contact with a segmental face-plate; and the adaptation of a valve or tongue, which directs the flow of the water.

In the accompanying plate, fig. 6, represents, in vertical section, the improved wheel *d, d, d, d,* having a series of curved recesses formed round its periphery, which are to constitute buckets. The elevated parts of the wheel, which are the partitions between the buckets, work in close contact with the segmental face-plate *e, e, e* ; and a circular flange on each side of the wheel, fitting closely to the face-plate, prevents the escape of water. A box *b,* above, receives the water from an elevation through the pipe or tube *a*; and a tongue or valve *c,* working upon a hinge-joint, guides the water to the descending side of the wheel. As the wheel revolves, the outer edge of the tongue *c,* acts upon the curved surfaces of the buckets, rising and falling as the elevations and depressions on the periphery of the wheel pass under it, but always keeping in contact with the periphery of the wheel, and thereby preventing the water from flowing into the buckets on the ascending parts of the wheel.—By these means, the whole of the water, from the box *b,* is directed to one side of the wheel; and being there confined in the buckets, and prevented from escaping by the flanges and segmental face, its gravitating force acts upon a greater extent of the periphery of the wheel than it could possibly do upon any of the ordinary constructions of water-wheels having open buckets.

The particular features of improvement which I claim, in reference to water-wheels, are the curved recesses on the periphery of the wheel, with their side flanges,—and the tongue or valve working therein for the purpose of directing the flow of the water; by which means I am enabled to avail myself of, and use beneficially, the whole of the gravitating force of the descending stream of water. The same construction of wheel may also be employed for raising or forcing water, by applying a suitable power to its shaft or axle.

I would lastly observe, that instead of the lever valves *a*, in fig. 1, and *c*, in fig. 6, slide valves might be employed to effect the same purpose.—[*Inrolled in the Rolls Chapel Office, May* 1840.]

Specification drawn by Messrs. Newton and Berry.

To JAMES BARLOW, *of Birmingham, in the county of Warwick, brass-founder, for an invention of certain improvements in the construction of candlesticks; being partly a communication from a foreigner, residing abroad.*—[Sealed 25th April, 1839.]

THESE improvements in the construction of candlesticks, consist, firstly, in a new mode of holding the candle securely in the socket; and, secondly, in peculiar methods of connecting the parts of a candlestick together without solder.

The form of the candlestick is not necessarily effected by the adaptation of these improvements, therefore they may be applied to almost every shape of candlestick. It will however suffice to shew them in connection with some of the usual kinds and forms, as from thence it will be perceived, that very slight alterations only may be necessary to adapt the same improvements to other kinds and shapes.

In Plate IX., fig. 1, represents a vertical section of an ordinary table candlestick.—*a, a,* is the socket; within this is situate an elastic holder *b, b,* for the end of the candle to be inserted into, which is formed of a number of spring tongues, combined in the manner shewn at fig. 2.

A convenient method of making elastic holders, is shewn at fig. 3. A plate of thin steel (or it may be some other metal,) is cut into a star form; its ends or tongues are then bent up to the shape of the elastic holder, represented in fig. 2; but I do not intend to confine myself to this par-

ticular mode of constructing an elastic holder, as it might be formed by springs, combined in several other ways.

A disc of metal *c*, is attached to the base of the elastic holder *b*, by means of riveting or otherwise. The edge of this disc is turned down all round, as a broad flange, which is made to embrace and hold fast one end of a cork, to be afterwards driven firmly into the shaft of the candlestick, as at *d, d*, fig. 1. By these means the elastic holder *b*, is secured in its proper place within the socket.

In some instances the cork is dispensed with, and the disc and holder fastened to the socket by pins, screws, rivets, or other modes of attachment, as shewn in fig. 4. Or the elastic holder may be made of a cylindrical form, at its lower part, and be riveted or otherwise attached immediately to the socket, without employing a disc. I also sometimes fasten the elastic holder to the top of the socket or to the nozzle, so as allow the spring tongues to project above the candlestick; and in some cases I attach the holder by means of what is called a bayonet fastening, in order that it may be readily detached, if necessary.

A cup *e*, in which the bottom of the candle rests within the spring holder, is attached to the top of the rod *f*, constituting what is commonly called the "*push up*," for raising the candle in the socket, and which I also employ for expanding the elastic holder, when a fresh candle is to be introduced.—Some other forms of candle-holder, applicable to the same purpose, I shall describe hereafter.

The form of fig. 1, is that of our ordinary cast metal candlestick, in the manufacture of which I propose no novelty. The second feature of my invention, (viz.) the peculiar methods of connecting the parts of a candlestick together without solder, applies, principally, to those which are called in the trade "sheet hand" candlesticks.—It perhaps may be scarcely necessary to observe, that the several

parts of such candlesticks, when properly shaped, are usually connected together, at the junctions, by solder or brazing;—this improvement, it is therefore to be observed, is a method or methods of forming such junctions, by locking and bolting the parts together; in which I employ a peculiar kind of bolt,—when a bolt is used for attaching the foot to the shaft.

These descriptions of candlesticks, as fig. 4, usually consist principally of three parts; the nozzle *a, a*; the shaft *b, b*, and the foot *c, c*. The shaft is a cylindrical tube of metal, cut to the required length, and has a flange turned inward at the lower end. This tube is to be placed in suitable tools, for the purpose of forming an indentation at the upper end. In order to effect this object, I provide a pair of cylindrical steel dies, shewn partly in section at fig. 5. These dies are exactly fitted to the tube, and in their upper parts have a circular recess or groove *d, d*, the lower part being formed with a shoulder, for the flange of the tube to rest upon. The tube being inserted in the hollow part of the die A, A, the plunger B, constituting part of the upper die C, is then introduced, and by the pressure exerted from above, a portion of the tube is forced out into the circular recess, and made to form a bead or boss, at *d, d*. The tube, so prepared as the shaft of the candlestick, is now ready for receiving the nozzle to be attached to its upper end.

The part for the nozzle *a, a*, having been formed in the ordinary way, by stamping,—the shaft *b, b*, above described, is to be introduced into another hollow die, shewn in section at A, A, fig. 6. The nozzle *a, a*, having a circular aperture in the middle, is then placed upon the shaft, bearing upon the boss or bead, as shewn by dots at *d, d*; and the plunger B, being inserted, pressure is exerted by

the upper die c, on the top of the tube, sufficient to crush its end outward, and bring the parts together, so as to secure the nozzle to the shaft, in the way shewn at fig. 4.

Although the principal parts of a "sheet hand" candlestick are usually united by soldering or brazing, the foot is sometimes attached to the shaft or socket in a manner similar to that shewn in fig. 4, where the plates or discs *e*, *f*, *g*, are employed in securing the socket and foot together by means of the solid bolt *h*; but as the solid bolt *h*, prevents the stem of the "push-up" from passing through the bottom of the candlestick, I employ, in lieu thereof, a tubular rivet, or hollow bolt, as shewn at *i*, *i*, *i*, *i*, figs. 8, 9, 11, and 12; and I sometimes cause the tubular rivet or bolt *i*, *i*, to include the flange of the spring-holder, and thereby attach it firmly to the bottom of the socket, as shewn in figs. 8 and 11. A cork being firmly driven into the hollow bolt *i*, *i*, prevents the tallow from leaking out when melted; and also provides a convenient passage for the stem of the "pusher-up." The lower end of the shaft may also be connected to the foot by locking, in a similar manner to that described for locking the nozzle and socket together, see fig. 7, where a cork is also shewn, through which the stem of the "pusher-up" also passes;—this cork is secured in its place by being forced in, and then expanding into a recess, formed in the shaft, as shewn in the figure.

The manner of connecting the parts of the candlestick may, however, be varied, without deviating from the above principle of locking the junctions, some examples of which are shewn in figs. 7, 8, and 9.

In fig. 7, the nozzle is formed with an external flange, turned downward, which is connected to the upper part of the shaft (previously prepared with a small lip, turned out-

ward and downward) by pressure, in a similar manner to that described, in reference to figs. 5 and 6. The nozzles of figs. 8 and 9, have each an internal flange, connected to the upper part of the shaft by pressure, in like manner.

In some instances, I attach the end of the stem of the "pusher-up" to a sliding piece *k*, fig. 4, situate within the shaft, and raise or depress the "pusher-up" by a ring *l*, *l*, connected to it, which slides on the outside of the shaft.

In some cases I make the spring candle-holder moveable, as at fig. 9, by attaching it to a sliding staple *m*, *m*, which is connected to a ring *n*, *n*, sliding on the outside of the candlestick. By raising the sliding staple, as at fig. 10, the spring holder is allowed to expand, when the candle may be introduced,—and on pushing it down again, as at fig. 9, the springs are made to collapse, and hold the candle securely.

Fig. 11, shows another modification, in which the arms of the holder are made to collapse within the socket, by sliding down a ring *p*, *p*, which is connected to an internal ring or nibs, pressing against the sides of the springs.

And I sometimes construct the holder by attaching three convolute springs to the internal part of the socket, and expand them, when a candle is to be introduced, by means of a snail cam, (as shewn at fig. 12,) which may be readily turned round by any convenient contrivance below.—I would here remark, that I sometimes attach my candle-holder to a false nozzle;—and I would also observe, that the above described improvements are applicable to every description of candlestick, whether made of silver, brass, iron, tin, or any other suitable material.

Lastly, I desire it to be understood, that I claim, as one of the features of this invention of improvements in candlesticks, an elastic holder for the candle, connected to the socket by whatever means, and however formed; and also

the modes of joining the parts of candlesticks, by locking or securing them together in the manner set forth in the above description, and drawings.—[*Inrolled in the Rolls Chapel Office, October,* 1839.]

Specification drawn by Messrs. Newton and Berry.

To JAMES YATES, *of the Effingham Works, Rotherham, in the county of York, iron-founder and earthenware manufacturer, for his invention of certain improvements in the construction of cupola or blast furnaces for melting metals; which improvements are also applicable to furnaces or fire-places for other purposes.*—[Sealed 1st November, 1839.]

MY improvement in furnaces, as applicable to the cupola furnace for melting metals, consists :—

First, in constructing that part of the interior, where the fuel and material is placed, in such a manner as to arrest, as much as possible, the escape or progress of the caloric, unconsumed air, gases, spark dust, or other matter, which, in the ordinary cupola furnace, is allowed to pass freely away,—these furnaces having an open chimney and open feed-hole. I accomplish this in the following way :—I place an impinging or arresting arch, dome, or ceiling, over the hearth and boshes; or a partial arch, dome, or ceiling, over the hearth and boshes at a short distance above where the fuel and metal is placed. I close up the feed-hole by a door or otherwise, and leaving only a small aperture in the ceiling, or in one or more of the sides, sufficiently large only to allow such gases, &c., to escape as cannot be consumed in the furnace.

My improvement consists, secondly, in introducing a

series of impinging arches, ceilings, or shelves, for the more effectually arresting the escape or progress of the gases, spark dust, &c.; and thirdly, in introducing a valve or damper at the top, or other part of the chimney, for the purpose of regulating the escape of the gases, &c.

The advantages I gain over the ordinary cupola furnace, which has an open chimney and open feed-hole, are, first, the retaining and making use of a large portion of heat, which, in the old cupola, would pass away; by the application of which heat, together with the exclusion of cold atmospheric air, the material to be melted is forwarded very much in the process of melting, requiring much less fuel; and by being melted much quicker, and the melting taking place considerably higher, or at a greater distance from the admission of the blast, much time is saved; and there is considerably less waste of metal, by oxidation, than in the old cupola, where the melting takes place near the blast, and being longer exposed to its action.

Secondly,—there is also considerable saving of fuel during the intervals of melting, when the hearth has to be filled with fuel to keep up the heat; at which times, in the old furnace, a large portion is consumed in consequence of its exposure to the action of the atmosphere; whereas in the improved furnace, all is closed up, excepting a small portion of the damper hole; and by which means, the heat is kept up, and little or no fuel is consumed.

Thirdly,—the spark dust, &c., which, from the ordinary cupola, issues forth to the great annoyance of all around, and detriment to the work going on, is, by these improvements, totally consumed or caught upon the shelves.

My improvement, as applicable to blast furnaces for melting or smelting ores, consists, first, in placing the impinging arch, dome, or ceiling, or the partial arch, dome, or ceiling, over the hearth and boshes, and near to the

same, for the purpose of confining the heat as much as possible, as before described.

Secondly, in forming one or more shelves on the top, or above the said arch, dome, or ceiling, for the purpose of placing the ore upon, and exposing it, with or without a very small portion of fuel, to the action of the heat that would otherwise pass away uselessly.

The ore having been thus exposed to the heat for a sufficient length of time, is brought into a state of preparation for smelting, which smelting is more actively going on within the boshes, and into which place it is removed by stokers, or any other more convenient means; the whole or the greater part of the fuel being introduced directly into the boshes, without being exposed to the action of the heat, or being exposed but a short time.

Thirdly,—In introducing a damper or dampers at the top, or any other situation, for the purpose of regulating the escape of the gases, &c.

The advantages I gain over the ordinary blast furnace, which has the high shaft without interceptions in the interior, and with open top, are :—First,—The saving a large portion of fuel when the furnace is first set to work, as it needs only to be filled to or near to the impinging arch.

Secondly,—The saving of the whole, or nearly the whole of the fuel that is consumed in its passage from the top of the ordinary furnace to the boshes.

Thirdly,—In the small expences and short time required in blowing out the furnace for repairs, or other purposes, and starting again.

Fourthly,—In the small power required for blowing the blast, which is required to be of a low pressure, not having so heavy a mass to force its way through.

My improvement, as applicable to the furnaces and chimnies of locomotive and steam packet engines, and other

furnaces and chimnies, is in introducing the impinging or arresting partitions or shelves into the interior of such chimney, furnace, or flue; by which means, spark dust, or other substances, are consumed or caught upon the shelves, or in receptacles prepared for that purpose; and by which means also, when the steam is turned into the chimney, the water from the condensed steam is prevented escaping from the top of the chimney, and is conveyed, by the channels upon the shelves, to the receptacle prepared for them. And for the better securing draughts, and preventing gusts of wind from blowing down the chimney, I use my balance hood. When the steam is allowed to escape through a separate pipe, not through the chimney, the impinging or arresting shelves may be made as if to prevent the water escaping from the top, in the same way as within the chimney.

The advantages of the above improvement are obvious from this description.

My improvement, as applicable to the furnaces of stoves for giving out heat, is in introducing the impinging or arresting partition or shelves; which partition or shelves, for this purpose, I make hollow, having an opening through each, so that a current of air may pass through; by which means I expose a large heated surface to the surrounding atmosphere, which carries off the heat that would otherwise pass up the chimney.

My improvement in furnaces extends to the mode of manufacturing bricks, to make them withstand the action of the intense heat to which they are exposed, which I accomplish in the manner following:—

I take the clay, usually used for fire-bricks, and temper it in the usual manner; I then form it into thin sheets or cylinders, or other shapes, so as to leave sufficient room, when piled in the kiln, for the heat to get freely round

them;—I bake these sheets, or other shaped pieces of thin clay, in a very high degree; and when this is done, I have them crushed down into pieces, the size of peas, or small beans; which pieces I put into strong moulds made to the form required, and amongst which I pour a thin "slip" or mixture, made of a small portion of the best fire clay, mixed up with rice water;—I make the rice water by soaking or creeing the rice for a considerable time, and then boiling it up well; when the pieces of baked clay and the "slip" are thus put in the moulds, I compress them in the mould by a powerful press or stamper, and then bake them in the kiln to a very high temperature.

Having now described my invention, I proceed to describe the drawings or figures, as follow:—

Fig. 1, Plate X., represents the exterior or front of the cupola for melting metals, on the side where it is fed. *f*, *f*, cast-iron columns;—there are four of these, as shewn on plan; *d*, *d*, the barrel, made of wrought or cast-iron,—I prefer wrought-iron; *e*, a plate of cast-iron, resting on the top of the columns, with a raised moulding, forming a rabbit to hold the lower part of the corner plates *g*, *g*, which are further secured by seven bolts, as shewn; *a*, the door of cast-iron, closing up the feed-hole;—this door is either hung on hinges, to open sideways, or on arched levers, balanced, so that it may be easily raised perpendicularly;—the interior of this door is lined with fire-brick; *b*, a second feed-door, to be used whilst the cupola is at work; *c*, *c*, *c*, are smaller doors, so situated that a "coll" or rake may be introduced through them, to clear away the dust, &c., from the shelves; *h*, the regulating damper or valve, with balance lever, made with one, two, or more doors,—I prefer four; these levers presenting inclined planes, cause the wind to glide off from every quarter, thereby preventing it blowing down, or pressing upon the

interior of the chimney; the round plates and bolts shewn, are to hold the masonry together.

Fig. 2, represents the interior or section of fig. 1; *n*, the tapping-hole, from whence the metal is drawn out; *i*, the hearth; *k*, the boshes or oven, where the metal and fuel are placed; *l*, the first impinging arch, roof, or ceiling; *m*, *m*, *m*, other impinging arches, arresters, or shelves; *i*, *i*, twyers, through which the air is admitted into the furnace.

Fig. 3, represents another exterior or side view of the same,—similar letters referring to the same parts, as in figs. 1, and 2;—*d*, the barrel; *m*, the tapping hole; *f*, *f*, the columns; *e*, the plate on which the masonry rests; *g*, *g*, the corner or bracing plates.

Fig. 4, represents another section in the line *c*, *d*, in fig. 6,—the same letters referring to the same parts as figs. 1, 2, and 3;—*i*, the hearth; *k*, the boshes or oven; *l*, the first impinging arch, roof, or ceiling; *m*, *m*, *m*, *m*, *m*, *m*, other impinging arches, arresters, or shelves; *a*, the door closing up the first or large feed hole; *b*, the door closing up the second or smaller feed hole; *c*, *c*, *c*, the doors closing up the openings through which the shelves are cleaned.

Fig. 5, represents the interior differently arranged to fig. 4,—the impinging arch being reversed, and the smaller feed hole so situated, that material may be placed upon the top of it, so as to receive heat passing away, and thus, become better prepared to enter the oven or boshes; fig. 6, is a horizontal section across *x*, *x*, fig. 1; *f*, *f*, *f*, *f*, the column; *d*, *d*, the barrel; *i*, the hearth; *n*, the tapping hole.

Fig. 7, is another horizontal section, taken at *y*, *y*, fig. 1; *i*, the hearth; *k*, the oven or boshes; *a*, the door; *e*, *e*, the plate resting on columns, and upon which the masonry stands.

Fig. 8, represents another arrangement of the interior; *i*, the hearth; *k*, the oven or boshes, without door; *l, l*, the impinging arch, with a small opening in the centre, through which the material is passed after having been exposed to the heat in the upper oven *p*.

Fig. 9, another arrangement, with upper ovens.

Fig. 10, represents only one impinging arch, dome, or ceiling, or partial arch, dome, or ceiling, having a small opening through the centre; and *r*, a narrow shaft or chimney; this may be used without any other impinging arches, arresters, or shelves, being a cheaper furnace to fix than any of the others; but it is inferior to any of them.

Fig. 11, represents the furnace with one impinging arch, and with a horizontal flue *s*, shewn by the dotted lines, or with a descending flue *t*; either of these flues may be carried to any shaft at a distance.

Fig. 12. represents the interior of a furnace of large dimensions, adapted more particularly for the smelting of ores; the shelf over the impinging arch, or dome *l*, being the place where the principal fuel is introduced, and the upper shelf *m*, or as a great number of them as may be required, are for the purpose of holding the ore to be exposed to the action of the heat that is passing away; *x*, is an opening through which the stoker passes;—this furnace has the regulating damper.

Fig. 13, represents another view of the exterior of a furnace, adapted for the smelting of ores, having a large upper oven immediately over the first impinging arch *l, l*, to heat and prepare the ore before it is passed into the first oven or boshes *k*; *v, v*, are apertures in the upper roof or arch, through which the material is conveyed from the shelves; these apertures are provided with covers to prevent the heat escaping, and may be increased in number,

as may be most convenient; *w*, is an aperture over the centre or hearth, through which the fuel or the principal portion of the fuel is conveyed, directly within the first oven or boshes *k*;—*u*, *u*, are openings through which the stokers pass,—these stokers sliding through balls, which balls work in sockets, as shewn at *u**; *r*, *r*, are chimnies which have regulating dampers attached to them, for the purpose of regulating the escape of gases, &c.;—these chimnies may be increased in number.

Fig. 17, represents the lower part of a furnace for melting or smelting metal or ore, or for other purposes, with a series of vertical apertures, at or near the bottom, sloping downwards towards the interior; through these apertures the air is forced by the pressure of the external atmosphere, instead of a forced blast by machinery, the quantity admitted being regulated by the damper; the apertures or twyers, here described, as well as those for the other furnaces, I form in strong moulds, in the manner before described, for the bricks.

I do not confine myself to the particular forms here represented for my furnaces, but to the principles hereafter described.

Fig. 14, is a section of a chimney and balanced circular hood, for locomotive or steam-packet engine, or any other chimney in which my impinging or arresting shelves *b*, *b*, *b*, *b*, *b*, *b*, *b*, *b*, are placed, for the purpose of arresting and consuming, or catching spark dust, or other substance, as well as condensed steam, and thereby preventing its escape from the top of the chimney; on the top is placed a hood *f*, resting upon a rounded collar *h*, and being balanced by the ball *g*, a very small pressure of wind will press the side next the wind close to the chimney; the other side becoming open, it prevents the wind blowing down the chimney.

Fig. 15, is a section of a chimney, shewing the impinging or arresting shelves, so arranged, that the dust or water may glide off and be deposited in the receptacle *d*.

Fig. 16, is a section of a furnace or stove, with my impinging shelves made hollow; *e*, the furnace or fire-place; *b*, *b*, *b*, *b*, the impinging shelves; *c*, the escape pipe.

I claim, as my invention, as applied to cupola furnaces for melting metals, first,—the impinging arch, dome, or ceiling, or partial arch, dome, or ceiling. (This may be used alone, without any other of my improvements.) Secondly, the closing up of the feed-hole or feed-holes, by a door or otherwise. (This may be used alone, without any other of my improvements.) Thirdly, the feeding over the arch, dome, or roof. Fourthly, the series of refracting, or arresting arches or shelves. Fifthly, the regulating damper, in any form or situation, and more particularly with one, two, or more doors.

I claim as my invention, as applied to cupola or blast urnaces, for smelting ores, first,—the impinging arch, dome, or ceiling, immediately over, or at a short distance above the boshes. Secondly, the shelf or shelves, on the top, or on a level, or above the said impinging arch; as also the series of impinging arches or shelves.

I claim as my invention, as applicable to furnace chimnies of locomotive, steam-packet, or other engines, the impinging or arresting shelves, with or without ledges, to arrest and convey away the water arising from the condensed steam, and for the purpose of arresting the progress or escape of spark dust, or other substance; and also the balance hood, as applied thereto.

I claim as my invention, as applicable to furnaces or stoves for giving out heat, the impinging shelf or shelves made hollow.

I claim as my invention, the series of vertical slits, or apertures, or twyers, near the bottom of furnaces, opening into the hearth, with a direction downwards.

I claim as my invention, the application and use of the bricks or twyers, made or manufactured as above described, in the construction of furnaces.—[*Inrolled in the Rolls Chapel Office, February*, 1840.]

To WALTER HANCOCK, *of Stratford, in the county of Essex, engineer, for his invention of an improvement or improvements upon steam boilers.*—[Sealed 15th January, 1833.]

THIS invention is stated to be an improvement upon a former patent for a steam boiler, dated 4th July, 1827. (See Vol. V., of our Second Series, page 152.)

The boiler is made by the combination of a series of oblong boxes or water chambers, placed vertically within a furnace, and connected together by transverse tubes, with bracing rods passed through them; the object being to expose a very extensive surface of the water chamber to the action of the fire, as a desirable construction for locomotive and road engines, whose cumbrous boilers cannot be conveniently applied.

The present boiler is composed of ten rectangular tubes or water vessels, which are placed parallel to each other in vertical positions. They are kept at equal distances asunder by rings, placed between every two of the tubes, and are secured by transverse rods, which extend from one side to the other through the rings.

Plate X., figs. 1 and 2, represent elevations of the boiler in two positions. *a*, *a*, is the outer casing; *b*, *b*, *b*, the

water chambers. The rods *c*, do not occupy the whole interior of the rings *d*, the unoccupied space forming a passage for steam and water, by means of which a communication is effected between the ten tubes. The two outer tubes are supported by the plates of the casing *a*; and the boiler is further strengthened by the rods *d*, *d*, *d*, whose ends are united by tye-bolts.

The fire is introduced into the furnace through the front door *e*, and the ashes are discharged at the door *f*. Thus far the boiler is nearly the same, in construction, as that which formed the subject of the former patent; but, as the tubes *b*, have been found liable to distention if they were not supported, the patentee now places small tubes *g*, *g*, *g*, *g*, between every two of the boxes *b*; which tubes *g*, are connected together, and with the rings *d*, by means of round tubing *h*, *h*,—and the square tube *i*, which passes direct from the upper to the lower ring, having its ends rounded to screw into the rings.

When any repairs are required, the rods and the bolts are taken off; the tubes *b*, may then be severally taken out, and the defective parts removed and replaced by new ones.

In this improvement, the fire-place *r*, instead of being situate under the boiler as usual, is placed before it, and the heat communicated by the flue. A box *k*, with its cover, is placed over the fire-place, being of sufficient dimensions to hold the supply of fuel required for one stage of the locomotive engine. The fuel is introduced into the box at top, and then the box closed air-tight, whence the fuel descends into the fire-place *x*, by its own weight, as it is required.

The front of the fire-place is provided with a vertical grating *l*, and the back of the fire-place is composed of a vertical grating of hollow tubes *m*. The air for supporting combustion, passing from the wind trunk *n*, rushes through

the vertical grating *l*, and drives the flame, heated gas, and smoke, between the hollow grating *m*, into the space immediately beneath the boiler; from whence it is conducted upward, between the several tubes, by the perforated plate *p*, and passes off at the top through the flue *q*.

The waste steam, from one of the cylinders, is discharged into the pipe *s*, and passes through the tubes *m*, into the spaces between the tubes of the boiler, where it incorporates with the flame, heated gas, and smoke. The waste or eduction steam from the other cylinder is discharged into the space *t*, and proceeds through the perforations in the plate *p*, and thereby preserves the plate from being burnt. The fire-grate *r*, is provided with two bars, at its under side, which have a series of teeth, taking into two pinions *u*, *u*, fastened on the same axis, which is turned by a handle.

By means of this rack, the fire-grate can be removed when clogged up with clinkers or slag, and a clean one substituted in its place. The ends of the rack hook into one another, so that, as the foul grate is removed, it draws on the clean one; or, for convenience, the grate may be composed of two parts, joined together, as shewn in the drawing.

The patentee claims the substitution of a series of hollow tubes, containing water and steam, for the iron bars, which were before interposed, as partitions, between the flat vessels, whereof the boiler is composed; and the arrangement of the fire-place, with a chamber over it for containing fuel; and vertical grates, on each side of the usual fire-grate, for the current of air to be blown through across the fire; and the drawing out and removing, from the fire-place, the fire-grate when foul, to change it for another clean grate.—[*Inrolled in the Petty Bag Office, July*, 1833.]

To Edmund Shaw, *of Fenchurch-street, in the City of London, Stationer, for an improvement in the manufacture of paper, by the application of a certain vegetable substance, not hitherto used for that purpose; being a communication from a foreigner residing abroad.*—[Sealed 14th September, 1837.]

The new material employed by the patentee, for the manufacture of paper, is the storks and leaves, or envelopes of the seed of Indian corn or maize. These matters are macerated in an alkaline solution, heated by steam, or in any other convenient manner, in order to separate the fibrous parts from the other extraneous or useless matters adhering thereto.

The fibres, thus obtained, are then placed in a bleaching solution, consisting of chloride of lime, in which they are beaten or stirred about, in order to make the bleaching material act properly and sufficiently upon the fibres.—*Inrolled in the Inrolment Office, March,* 1838.]

To Edmumd Shaw, *of Fenchureh-street, in the City of London, Stationer, for improvements in the manufacture of paper and paper boards; being a communication from a foreigner residing abroad.*—[Sealed 5th May, 1838.]

This invention is for the application of bituminous products to the manufacture of paper. The method of preparing the bituminous materials is thus described by the patentee:—Take either mineral or vegetable tar, (Dantzic tar by preference,) and deprive it of its essential oil, by

distillation, after which dissolve the product by boiling it in a solution of potash.

The quantity of pitch to be added to the paper pulp must be regulated according to the quality or nature of the paper to be made, and therefore the patentee has not stated any proportions. The claim is for the application of bituminous matters to the manufacture of paper and paper board, as above described.—[*Inrolled in the Inrolment Office, November*, 1838.]

To MORTON BALMANNO, *of Queen-street, Cheapside, in the city of London, merchant, for his invention of a new or improved method of making and manufacturing paper, pasteboard, felt, and tissues.*—[Sealed 6th September, 1838.]

THE present invention consists in the application of several different materials to the manufacture of paper, such materials not having been hitherto so employed.

The substances employed by the patentee are divided into five species, according to their nature, consisting, firstly, of the bark or outer covering of trees and young shoots, such as osiers; secondly, such plants as have a fibrous coating, and but little internal fibre, such as hop-bine. The application of this plant, to the manufacture of paper, has been patented over and over again; and has been tried and in use many years.

The third description of material employed, is all those plants which partake of the nature of hemp and flax, and have little or no fibrous coating, but consist of fibres throughout, such as the leaves and storks of the potatoe plant; fourthly, the fibrous roots of trees, such as liquo-

rice and other similar roots; and fifthly, dead or dried leaves and other refuse of a similar character.

The patentee has described the different methods to be pursued in preparing and bleaching the above materials, and reducing them to the state of paper pulp; but as the *modus operandi*, described in the specification, is the same as is generally employed, under similar circumstances, and as moreover such processes constitute no part of the invention, we have not thought it necessary to enter into any detailed explanation, merely observing that the materials are all treated and prepared in different ways, according to their nature, and according to the quality of the material required to be made.—[*Inrolled in the Inrolment Office, March*, 1839.]

To EDWARD COOPER, *of Piccadilly, in the county of Middlesex, stationer, for an invention of improvements in the manufacture of paper,—being a communication from a certain foreigner, residing abroad.*—[Sealed 8th November, 1838.]

THE invention before us is divided into two parts, consisting, firstly, in the application of a new material for the manufacture of paper; and secondly, improvements in the apparatus for reducing the rags and other materials to pulp.

The new material employed by the patentee, is the refuse of the sugar manufacture, or the crushed and bruised cane, after all the saccharine matter has been expressed therefrom. This material has hitherto only been employed for lighting and keeping up the fires in the sugar house,—therefore, by employing this article in the manufacture of paper, the price thereof will be much reduced.

The second part of the invention is for an improved machine for reducing the rags to paper pulp.

Previous to describing the improvement, the patentee has observed, that in the ordinary machines for making the paper pulp, the triturating cylinder (which weighs from fifteen to twenty hundred weight,) is adjustable, the axis being mounted in moveable bearings, and adjusted or regulated so as to bear more or less upon the rags or other materials to be reduced. The "plate" or bed, or that part of the apparatus on which the rags are placed, and against which the cylinder acts, is fixed and immoveable.—This arrangement has been found to have many disadvantages, owing to the great weight of the cylinder; and the patentee of the improved mode, proposes to mount the cylinder in fixed and stationary bearings, and to render the "plate" moveable and adjustable.

The figure, in Plate X., represents a longitudinal section of a machine, embodying the above-mentioned scheme. The triturating cylinder is shewn at *a*, and is furnished with teeth round its periphery, as in ordinary machines; *b*, is the "plate," which is also furnished with teeth, and is suspended in the chair *c*. The upper ends of the arms of this chair are connected, by pins, to the long levers *d, d*, which are mounted in bearings at *e, e*. Weights *f, f*, are placed on the levers *d, d*, and are moved or slidden along the same, according to the pressure required, by means of cords or chains *g, g*, passing under and over pullies *h, h*.

From the foregoing description, it will be evident, that by sliding the weights *f, f*, further from, or nearer to the fulcra *e, e*, of the levers *d, d*, the pressure of the plate *b*, against the under side of the cylinder, may be increased or lessened at pleasure.

The patentee claims, firstly, the employment of the

sugar cane for making pulp for the manufacture of paper; and secondly, the improved machine above described; in which the cylinder is mounted, horizontally, in fixed bearings, and the plate or bed is moveable and adjustable by weights.—[*Inrolled in the Inrolment Office, May,* 1839]

To JOHN EVANS, *of Birmingham, paper-maker, for improvements in the manufacture of paper.*—[Sealed 4th February, 1839.]

IN order to convert pulp into paper, by machinery, the pulp is either caused to adhere to a perforated cylinder, which revolves in the vat, or is passed in a sheet over an endless cloth, made of wire; and the water is expressed therefrom by the pressure of the atmosphere,—a vacuum, or partial vacuum having been previously formed inside the cylinder, or beneath the wire cloth.—This vacuum has generally been produced by a rotary blower, or by means of an air pump. Both of these modes are objectionable, inasmuch as the blower will not create a sufficient vacuum; and the air pump requires a considerable power to overcome the friction of an accurately fitted piston, moving with the cylinder; and the pump is also extremely liable to get out of order.

The patentee has, in his specification, described an apparatus which he says is not liable to derangement, under ordinary circumstances, and may be worked with much less power than an air pump; and also keeps up a regular exhaustion, and does not work by puffs as an air pump; which thereby frequently injures the paper, or makes it irregular and uneven.

The apparatus proposed, is shewn in Plate X.;—the

figure given represents a section of the apparatus, which consists of an oblong vessel *a*, *a*, divided into three chambers, by partitions *b*, *b*. Three upright pipes *c*, *d*, *e*, are attached to the exhausting pipe *f*, their lower ends being constantly open to the pipe *f*, and their upper ends being closed by a valve, which opens outwards.—These pipes are enclosed by cylinders *g*, *h*, *i*, open at bottom, and furnished at top with valves *j*, *j*, *j*, opening outwards.—These cylinders *g*, *h*, *i*, are connected, at their upper ends, by connecting rods *k*, *k*, *k*, to a three-throw crank, placed above, and driven in any convenient manner.

It will now be evident, that if the exhausting pipe *f*, is in communication with the vacuum chamber, and the apparatus is set in motion, that the cylinders will rise into the position shewn in the drawing; and as they rise, the air will be drawn from the upright pipes through the valves at top, as seen at *h*, until the cylinder rises into the position of the cylinder *g*, when it will again descend and expel the air, contained therein, through the valve *j*, the air being prevented from returning to the exhausting pipe by the valve, which is at the top of the upright pipe. One cylinder is drawing the air from the exhausting pipe, while the others are expelling the air contained in them; and, as one is always exhausting, a continuous and regular action takes place.

The patentee claims the method, hereinbefore described, of creating a vacuum for the manufacture of paper.—[*Inrolled in the Inrolment Office, August,* 1839.]

To Richard Roe, *of Everton, near Bawtry, in the county of York, gentleman, for his invention of a certain improvement or certain improvements in machinery or apparatus for making bricks, tiles, and other articles, made from earthy materials.*—[Sealed 17th June, 1837.]

This invention is not for making or forming bricks, but a machine, of a novel and improved construction, for compressing or condensing the bricks after they have been made.

The bricks are put into a mould, and retained therein by a cover, that is held down by a cross head, which is attached to two arms, mounted on pins, affixed to the frame-work below. The brick is supported in the mould by a piston, to the under side of which is attached a piston rod, consisting, in fact, of two piston rods, one inside the other. Immediately beneath these piston rods, two cams are mounted upon a shaft, that revolves in bearings, formed in the frame-work. Upon the same shaft is mounted a cog-wheel, which is actuated by a pinion, mounted on the driving shaft.

A brick being placed in the mould, the machine is set in motion by a winch handle, on the pinion shaft, and the pinion gearing into the cog-wheel, causes it, its shaft, and the cams, to revolve, and thereby raise the piston, which will force or press the clay against the under surface of the cover. The cam shaft continuing to revolve, will cause the cross head to be removed from the cover, which may then be lifted up by any mechanical means; and one of the cams, on the shaft below the piston rods, is mounted in such a manner as to act against the lower end of one of the piston rods, so as to press up the piston, and thereby

force the brick out of the mould. The delivery of the brick being further effected by means of an auxiliary lever.

The patentee claims the combination of mechanical contrivances employed for compressing brick; and further says, that it may be applied to pressing peat earth.—[*Inrolled in the Inrolment Office, December,* 1837.]

To Herman Hendriks, *of Dunkirk, in the kingdom of France, but now of the Strand, in the county of Middlesex, gentleman, (in consequence of a communication from a foreigner, residing abroad,) for improvements in manufacturing prussiate of potash and the prussiate of soda; and improvements in dyeing blue colours without indigo.*—[Sealed 19th October, 1833.]

This is a chemical preparation, intended to be employed as a substitute for indigo in dyeing woollen and other materials of a blue colour; or as a foundation for black and other colours, in which blue forms the base or fundamental tint.

The process of preparing and applying this dyeing material is soon told; but the patentee, from what motive is best known to himself, has thought proper to extend his description to such an enormous length, that a literal copy of the document could not be obtained from the Inrolment Office for a smaller sum than about eighty five-pounds.

A mixture is made of equal parts, by weight, of animal substances and potash, there having been previously mixed with the potash scraps of cast or forged iron, in the proportion of one part scraps to fifty parts potash. The animal substances to be employed, are dryed blood, horn

scrapings, horns and hoofs of animals, hair, feathers, refuse woollen, leather, leather cuttings, and bones.

This mixture is calcined in a close cylinder, and is agitated during the operation; and the calcining process being complete, the calcined matter is taken out of the cylinder, and cooled in conical moulds.

When the material so operated upon has become cold, it is to be moistened; water being used for the first process, and afterwards the weak solution of prussiate, arising from the washing of the calcined substances,—in the proportion of one quart, to each pound of calcined matter, stirring it with a rake at intervals.

After a few hours, the calcined matter is again placed in the cylinder, filling it three parts full; water is then admitted for the first process, and the weak solutions of prussiate afterwards.

A reservoir on one side of the cylinder, (having a cock,) is filled, half full, with a mixture of one part sulphuric acid, and ten parts water; the calcined matter is then boiled up, and when boiled sufficiently, is run off and filtered.

The process of boiling and filtering is to be repeated several times; after which, some concentrated solution of potash is added, and the materials again boiled up and filtered. From thence it is poured into a suitable vessel and crystallized; and when the crystals are formed, the prussiate of potash is obtained.

The mode of making prussiate of soda is precisely the same as that of making prussiate of potash, except that soda is substituted for potash.

The cloth to be dyed is passed through the following eighteen baths, in the order in which they are enumerated:—

1st. *The Acid Bath.*—This is composed of one part muriatic acid to fifty parts water, and is employed at a temperature from 77° to 100° Far.

2nd. *The Alkaline Bath.*—This is composed of one part carbonate of soda to one hundred parts water, and is employed at a temperature from 77° to 100° Far.

3rd. *The Alkaline Bath.*—This is composed of carbonate of soda, of the strength of three degrees of the Areometer for salts, and is employed at a temperature from 77° to 100° Far.

4th. *The Ferruginous Bath.*—This is composed of proto salt of iron, (as for instance, the neutral proto muriate,) of the strength of six degrees, and is employed at a temperature from 144° to 167° Far.

5th. *The Protoxided Ferruginous Bath.*—This is composed of proto salt of iron, and is employed at a temperature from 144° to 167° Far.

6th. *The Alkaline Bath.*—This bath is the same as the second.

7th. *The carbonated Saponaceous Bath.*—This is composed of soap neutralized, of the strength of ¼ of a degree, and is employed at a temperature from 190° to 212° Far.

8th. *The Prussiate Bath.*—This is composed of prussiate of potash, and muriatic acid, mixed according to the proportion required, to vary the colour, and is employed at a temperature from 122° to 144° Far.

9th. *The Prussiate Bath.*—This is composed of prussiate of potash, and muriatic acid, of the strength of one degree, and is employed at a temperature from 122° to 144° Far.

10th. *The Protoxided Ferruginous Bath.*—This is composed of proto muriate of iron, of the strength of four degrees, and is employed at a temperature from 190° to 212° Far.

11th. *The Per Oxidated Ferruginous Bath.*—This is composed of any of the per salts of iron, of the strength of ¼ of a degree, and is employed at a temperature from 122° to 144° Far.

12th. *The Acid Bath.*—This is composed of water, slightly acidulated with muriatic, or any other acid, except nitric acid, (which would turn the articles yellow,) and is employed at a temperature from 144° to 167° Far.

13th. *The Ammoniacal Bath.*—This is composed of one part liquid ammonia to two hundred parts water, and is employed at an ordinary temperature.

14th. *The Aluminous or Tin Bath.*—This is composed of the muriates of alumine or tin, of the strength of ¼ of a degree; and water charged with an earthy carbonate, such as lime, and is employed at a temperature from 112° to 144° Far.

15th. *The Red Bath.*—This is composed of madder, and is slightly acidulated with boracic acid, and is employed at a temperature from 190° to 212° Far.

16th. *The Hot Stove Bath.*—This is employed at a temperature from 122° to 141° Far., for increasing or diminishing the intensity of colour.

17th. *The Ammoniacal Bath.*—This bath is the same as the thirteenth, and is employed at an ordinary temperature.

18th. *The Acid Vapour Bath.*—This is composed of either sulphuric, muriatic, or acetic acid, and is employed at a temperature from 167° to 190° Far.—it is then finished in the usual manner.

The patentee claims, first,—the process of calcining and constantly agitating the mixture of animal and other substances, in closed cylinders or other closed vessels, for producing the prussiate of potash, and the prussiate of soda.

Secondly,—Fixing the oxide of iron on textile or other

substances, by means of single or double decomposition of the proto salt of iron; fixing the deutoxide of iron on the like substances, by immersing them in a bath, formed of the protoxide of iron, in a neutral state; producing a uniform oxygination of the protoxide of iron, by means of a current of warm air, and the use of an alkaline and saponaceous bath, before uniting the oxide of iron with the ferrocyanic acid; and afterwards by passing them into a bath, composed of a soluble ferrocyanate or prussiate; and thus producing a uniformity of colour; and the employment of a stove or bath, for reviving, increasing, or diminishing the intensity of colour, when dyeing blues without indigo.—[*Inrolled in the Inrolment Office, April,* 1834.]

Scientific Notices.

REPORT OF TRANSACTIONS OF THE INSTITUTION OF CIVIL ENGINEERS.

(Continued from page 112, Vol. XVII.)

March 24, 1840.

The President in the Chair.

"On the Manufacture of Flint Glass."

By Apsley Pellatt, Assoc. Inst. C. E.

Flint glass, called by the French "cristal," from its resemblance to real crystal, is composed of silex (whence the English name), to which is added carbonate of potash and litharge, or red lead; to which latter material is owing, not only its great specific gravity, but its superior lustre, its ductility, and power of refraction.

It is necessary for optical purposes that flint glass should be perfectly free from striæ, otherwise the rays of light passing through it diverge and become distorted, and this defect is caused by the want of homogeneity in the melted mass, occasi-

oned by the difficulty of perfectly fusing substances of such different density as the materials employed. The materials, being properly prepared, are thrown at intervals into a crucible of Stourbridge clay, which will hold about 1600 lbs. weight of glass when fused. The mouth of the crucible is then covered with a double stopper, but not luted, to permit the escape of the moisture remaining in the materials, as well as the carbonic acid gas and excess of oxygen. It requires from 50 to 60 hours application of a rapid, intense, and equal heat, to effect the perfect fusion of the materials and to drive off the gas; during which time the unfused particles and excess of salts are skimmed off as they rise to the surface. The progress of fusion cannot be watched, nor can any mechanical means for blending the material during fusion be resorted to, lest the intensity of heat requisite for the production of a perfectly homogeneous glass should be diminished, the quality of the product being influenced by any inattention on the part of the fireman, as well as by the state of the atmosphere or of the wind. It has been ascertained, that there is a certain point or crisis of fusion at which the melted metal must be kept to insure a glass fit for optical purposes, and even when that point be attained, and the crucible shall furnish proper glass during several hours, should there be such diminution of heat as to require the furnace to be closed, the remainder of the metal in the crucible becomes curdy and full of striæ, and thus unfit for use. It is the same with the glass made for the flat bore tubes for thermometers, which are never annealed, because the smoke of the annealing furnace would render the interior of the bore unfit for the reception of the mercury. These tubes will only bear the heat of the blow-pipe when they are made from a metal which has been produced under all the favorable circumstances before described. It is, therefore, to be inferred, that the most homogeneous and perfect flint glass can only be produced by exposure to an intense and equable degree of heat, and that any excess or diminution of that heat is injurious to its quality.

The English method of manufacturing the flint *plate* for optical purposes, is thus described:—About 7 lbs. weight of the metal

is taken in a ladle of a conical shape from the pot, at the proper point of fusion, and then blown into a hollow cylinder, cut open, and flattened into a sheet of glass of about 14 inches by 20, and varying in thickness from $\frac{3}{8}$ths to $\frac{1}{4}$th of an inch. This plate is afterwards annealed, and in this state goes into the hands of the optician, who cuts and grinds it into the requisite form. When a glass furnace is about to be put out, whole pots of metal are sometimes suffered to remain in it, and cool gradually. The crucibles being destroyed, pieces of glass may be cloven from the mass of metal, softened by heat, and made to assume the requsite form, and then ground. It is believed that the excellent glasses made by Frauenhoffer, and other manufacturers on the continent, are produced by some such means. On attempting to cut glass ware, it is easily perceived if it be sufficiently annealed; if not, the ware is put into tepid water, which is heated, and kept at the boiling point during several hours; it is then suffered to become gradually cold. This method is more efficacious than re-annealing by the ordinary means. A piece of unannealed barometer tube of 40 inches in length, being heated and quickly cooled, contracted only $\frac{1}{16}$th of an inch, whereas a similar piece, annealed by the usual means, contracted nearly $\frac{1}{8}$th of an inch. Unannealed flint glass, being heated and suddenly cooled in water, exhibits the appearance of a mass of crystals; it is thence inferred that the process of annealing renders the glass more compact and solid; it thus becomes incapable of polarization.

Flint glass being remarkably elastic, has caused it to be used for chronometers. To prove its elasticity, a hollow ball of unannealed glass of 3 inches diameter, weighing about 16 ounces, was dropped, *when cold*, from a height of 7 feet upon a stone floor; it rebounded uninjured about 3½ feet, but broke on falling to the ground after the rebound. Similar balls, both at a *bright* and a *low red heat*, were dropped from the same height, and both broke immediately without any rebound; thus demonstrating that its elasticity only exists while cold. Glass being sometimes deteriorated in the process of re-heating, not only in colour, but in its faculty of welding, by the sulphur

existing in the coal or coke used in the furnaces,—this is prevented by occasionally throwing about a quart of cold water on the fire; the explosive vapour thus raised, carries off the sulphureous gas.

The process of annealing has the remarkable property of carrying off from the glass the reddish tint imparted to it by manganese; and in large masses, not only the reddish tint disappears, but the glass sometimes becomes green or blue, probably by the action of the sulphureous acid gas from the coke. The reddish tint will however return, and the greenish one disappear, should the annealed glass be afterwards re-heated or re-melted. Should the pot crack during fusion, and the flame or smoke come in contact with the melted metal, a green tint and abundance of dense striæ will be the consequence. Such an accident can only be repaired, if the crack be accessible, by throwing cold water on the exuding metal, which thus becomes gradually cooled, and itself forms a lute, so as to enable the process of melting to be continued. Long experience has shown that the best fuel for melting glass in the furnaces, is oven-burnt coke mixed with a small quantity of screened coal.

Mr. Pellatt illustrated the preceding paper by specimens of glass exhibiting peculiar effects of crystallization; among them were cylindrical solid pieces of flint glass, which, from being suddenly cooled by plunging them into water, had the interior entirely dislocated, and were merely held together by the exterior coating; portions of tubes showing the same effect; a portion of a vase of white glass dipped into blue glass of a greater density—in cooling, the interior white glass appeared to be crushed by the contraction of the exterior coating; a similar vase of white and blue glass of more equal density had cooled, and bore cutting without cracking; a mass of optical glass, exhibiting striæ, specks, and imperfections; which, together with the modes of manufacture, he explained.

In answer to several questions, Mr. Pellatt was not aware of any attempt having been made to cut the bulb of Prince Rupert's drops: he believed the peculiar property of the bursting of these

drops or tears, on the end being broken, arose from a crack suddenly commencing and extending itself rapidly throughout the mass, causing the dislocation of the particles. Flint glass is seldom sufficiently fluid to make these drops; they are generally made from glass which does not contain lead.

Alluding to the use of plate glass in Nasmyth's Pneumatic Mirror, he observed that, owing to the absence of lead, plate glass was purer and more homogeneous than flint glass, and the equality of thickness produced by grinding and polishing enabled the curve caused by the pressure of the atmosphere to be very regular.

The use of coke as a fuel, by the regularity of its combustion, assists materially in producing good results, and prevents the injury which frequently arises from a difference in the heating powers of various coals: unfortunately, the form of the furnaces causes the greatest heat to be in the centre, thus acting most powerfully upon the backs of the pots, instead of being equally distributed around them, which would be more desirable and would insure better results.

Mr. Pellatt still continued to use nine parts of coke mingled with one part of small coal in preference to any other fuel. He had abandoned the use of gas coke, and now purchased small coal at a low price, which he converted into a moderately-hard coke, rather less dense than that used for smelting iron. In the north of England, a charge of coal generally remained in the oven during 48 hours; in London, only 36 hours; he made lighter charges and coked them in 24 hours. He still found the calorific effect of 8 or 9 lbs. of coke to be equal to that of 12 lbs. of coal; in his ovens, 20 cwt. of coal produced 14 cwt. of coke.

Mr. Parkes inquired, which was the best method of annealing tubes for water gauges on boilers? He generally used those prepared by Mr. Adie, of Liverpool, who annealed them by placing them in cold water and gradually raising the temperature to the boiling point, at which it was kept for 24 hours; yet, in spite of these precautions, which generally were successful, he had seen twelve of these tubes break in one day, while an ap-

parently ill-made tube had lasted six weeks. He found thin tubes last longer than thick ones. He was in the habit of removing the stains of bog water from his boiler guages by scouring them with emery; when reheated, they invariably broke; after many experiments, he tried the use of acid, which answered perfectly, and no tubes were subsequently broken.

Mr. Pellatt recommended boiling as a safe and good mode of annealing all kinds of glass; in the ordinary method of annealing, thick and thin ware is often subjected to the same process, and remains in the leer for the same period: this would account for the superior duration of the thin tubes. He attributed the fracture of the tubes to the tension of the exterior coating and the vibration caused by the process of cleaning: this effect was so well known that old tube could scarcely be sold, as it generally broke in cleaning.

Mr. Hawkins observed, that tubes almost invariably broke in merely removing dust from the inside, whether it was done by rubbing with a tight packing or by slightly wiping it out. In some experiments on the production of carbonic acid gas, he used glass tubes of $\frac{3}{4}$ of an inch internal diameter and $\frac{1}{4}$ of an inch thick: they bore a pressure of 100 atmospheres. Some wrought-iron tubes into which holes of $\frac{1}{4}$ of an inch diameter were drilled and pieces of glass inserted, bore a pressure of 600 atmospheres.

List of Patents

Granted by the French Government from the 1st of July to the 31st of October, 1839.—(continued.)

PATENTS FOR FIVE YEARS.

To Wiss, of Paris, represented in Paris by M. Perpigna, advocate of the French and Foreign Office for Patents, 2, ter: Rue Choiseul, for improvements in boots and gaiters.

Roumestan, of Paris, represented in Paris by M. Perpigna, advocate, for improvements in binding.

Fournels, represented in Paris by M. Perpigna, advocate, for a smoke consuming apparatus.

Deplaye, represented in Paris by M. Perpigna, advocate, for an application of bronze upon skins and varnished leather.

Perilleux Michelet, represented in Paris by M. Perpigna, advocate, for a new kind of canvass for embroidering.

Junot, of Paris, represented in Paris by M. Perpigna, advocate, for a new kind of shawl.

Sauvage, of Paris, represented in Paris by M. Perpigna, advocate, for a machine for making metallic lace holes.

Potter, of London, represented in Paris by M. Perpigna, advocate, for a process for printing, colouring, or dyeing tissues.

Weber, of Paris, represented in Paris by M. Perpigna, advocate, for a new process for fixing artificial teeth.

Garnier, of Paris, represented by M. Perpigna, advocate, for a machine for combing flax.

Bellaton Liandra and Salignat, of Lyons, represented in Paris by M. Perpigna, advocate, for an imitation-lace.

Sérane, of Montpellier, represented in Paris by M. Perpigna, advocate, for a process for wine making.

Saillard, of Vaugirard, represented by M. Perpigna, advocate, for concentrated broth for travellers.

Lejars Chavanne, Pernot, and Priot, of Paris, for rails made in vitrified substances.

Franc Blôque, of Paris, for a mixture for whitening and softening the hands.

Vincent, of Versailles, for an apparatus for making hydrogen gas.

Martin, represented in Paris by M. Perpigna, advocate, for improvements in fire-arms.

Shéritier and Dufresne, represented in Paris by M. Perpigna, advocate, for the purification of fish oil.

Lecellier Havard, of Villedieu, represented in Paris by M. Perpigna, advocate, for a new warming pan.

Miel, of Chateauroux, represented in Paris by M. Perpigna, advocate, for indestructible jewels.

Letievant, of Paris, for a cylindrical chopping board.

Guyenot, of Paris, for improvements in clock making.

Lhardigny, of Paris, for an apparatus for lighting with gas.

Balp and Blagnière, junr., of Lodere, for an apparatus for un-

ravelling old tissues and rendering them fit for being worked again.

Place, of Paris, for an improved zinc roofing.

Duchon, of Lyons, for an improved stove.

Thibault Son and Perraud, of Nantes, for melting of tallow without any odour.

Casanova, of Cyrmis, of Pont St. Esprit, (Gard,) for watches without hands or glasses.

Pierre and Duvergé, of Paris, for improvements in mathematical instruments.

Gary de Favier, of Paris, for an improved rail-road.

Girard, of Paris, for a new lock.

Dubée, of Nantes, for a moveable instrument for ruling paper.

Bouvard, of Lyons, for improvements in umbrellas.

Jourdan Brothers, of Marseilles, for the preservation, in their natural state, of animal and vegetable substances.

Kierszkowski, of Paris, for an apparatus for shower baths.

Munier, of Paris, for vegetable wax for waxing floors.

Munier, of Paris, for a composition for cleaning metals.

Montanier, of Nantes, for a Dynamometer for ascertaining the strength of all kinds of thread.

Astorquisa, of Paris, for an application of slate to the construction of billiard tables.

Apostoly, of Paris, for a regulator for distributing, in paper manufactories, the pulp upon the metallic cloth.

Mahiet, of Chinon, for a percussion gun with a new cartouch.

Marchal, of Vernon, for a machine for piercing iron.

Hutmes and Capitain, of Paris, for cast-iron chimnies.

Guilbert Danelle, of Paris, for incrustations on wood for furniture, &c.

Lyon Crémieux Father and Son, of Lodève, for a machine for unravelling woollen rags.

Vallod, of Paris, for an apparatus for washing, drying, and preserving corn.

Couvers and Boudstot, of Besançon, for an improved hydraulic machine on the re-action principle.

Feuillet, of Paris, for a mechanical typographic press.

Debrinay Boiffard, of Romorantin, for an instrument for shaping leather in the making of shoes and boots.

Chemery and Paspète, of Sedan, for a machine for making zinc links, to be used in the weaving of cloth instead of woollen loops generally used.

Martin-Boulard, of Villeneuve L'Archevèque, for vegetable blacking.

Letestu, of Paris, for an improved picture frame.

Léonard, of Charteville, for a process for extending window glasses.

Huré, of Paris, for silk buttons, with a flexible silken shank.

Gerbet, of Paris, for a waggon, to be used for excavating and removing the earth.

John, of Paris, for manufacturing of pipes, called *Ecume de Mer*, with indigenous substances.

Coulon, of Paris, for an improved gridiron.

Bucquet, of Bordeaux, for a machine for chopping meat.

Faucon, of Beaucaire, for an hydraulic machine, with a force pump.

Toumsin, of Paris, for improvements in copper weights.

Jullien, of Aix, (Bouches du Rhone,) for a machine for making caps in impermeable substances.

Caron, of Paris, for a new motive power.

Banquet, of Paris, for a new machine for drilling land.

Roussillon, of Baverans, (Jura,) for a portable machine for thrashing corn.

Puval Brothers, of La Chapelle Iron, (Calvadocs) for a machine for reducing dye wood into powder or shavings, &c.

Olivier, of Pont Audemer, (Paire,) for a horizontal water wheel.

Meigret, of Lapetite Villette, (Seine,) for ovens for baking plaster.

Esprit, of Lyons, for improvements in weaving plain silks.

Chauderlot-Chevaller, of Rheims, for light deflectors, made of zinc.

Cuillier, of Paris, for an apparatus for driving waggons on rail-roads, with a rise from 10 to 15 degrees.

Placet Son, of Paris, for trimmings for hats.

Stombe Brothers, of Ribemont, (Aisne,) for a process for preserving wheat from decay.

Daudé, of Paris, for an instrument for making metallic lace holes.

Bredard, of Paris, for a new kind of shoes for soldiers, sportsmen, &c.

Bonnet, of Rousset, (Bouches du Rhone,) for a double-action plough.

Sterling, of Bordeaux, for a new capstern.

Bedouin, of Paris, for an instrument for taking the measure of shoes.

Orqué, of Paris, for an improved buckram for millinery.

Pery, of St. Germain en Laye, for a pomatum for the hair.

Ancel and Pellot, of Paris, for a new flooring.

Hue, of Mortagne, for a machine for economising horse power.

Rigaut, of Morcourt, (Aisne,) for a frame for manufacturing net, called " Valenciennes."

Peyret, of St. Etienne, (haute Loire,) for a new system of railroads.

Mansard and Monceau, of Mony, (Oise,) for a spinning card.

Hurel and Greyenbiche, of Strasbourg, for an application of vitrified earths for lining wooden smoking pipes.

Guerrier, of Vienne, (Isère,) for a machine for raising the pile of woollen cloths.

Ding, of Grenoble, (Isère,) for six new stoves for burning anthracite.

Cohin, of Bonnétable, (Sarthe,) for a new gun.

Charrière, of Paris, for acoustic contrivances, applicable to carriages.

Charrière and Vannet, of Paris, for a new substance and process for sharpening razors, &c.

Allien, of Paris, for paper matches and matches without explosion

Sirven, of Montmartre, for a new pocket book.

Klotz, of Strasbourg, for a machine for making panels, flooring, &c.

Perrier, of Batignolles, (Seine,) for a substance for paper-making.

Penelle, of Domfront, (Orne,) for an improved weaving apparatus.

Paumier, of Paris, for a new system of boots and shoes.

Lemit, of Sablonville, for an apparatus for warming linen.

Gueroult, of Passy, for a machine for moistening the earths used for earthenwares.

Filliot Son, of Paris, for an inodorous close stool.

Delabarre Son, of Rouen, for an improved coffee mill.

Coignet, of Paris, for a new figured crape.

Romance, of Paris, for a rotary steam-engine.

Cauche, of Paris, for a new method of righting photogenic images.

Bauchery, of Paris, for a bronze matrix for stamping.

Alaux, of Paris, for a chemical liquid preparation for diluting oil colours, and animal powder for drying the same in six hours.

Cochet, of Paris, for a new kind of shoes.

Darru, of Paris, for a locomotive coffee pot.

Guillemin Brothers, of Paris, for a wafer-cutting machine.

Gondeau,, of Puteaux, (Seine,) for a frame for printing stuffs.

Martinet, of Rouen, for improvements in weaving-frames, worked by hand.

Veillas, of St. Quentin, (Aisne,) for an improved reed for weaving.

Vandermère, of Paris, for a new piano.

Vallée and Bourniche, of Paris, for an archygrometric canvass, for painting.

Thiery, of Paris, for improvements in table knives.

Lorimier Son, of Paris, for calculating cylinders.

Letestu, of Paris, for a new system of articulated boats.

Guignet, of Arles, (Bouches du Rhône,) for a silk hat without a seam.

Ratier, of Liglet, (Vienne,) for a new plough.

Lambert, Guillot, and Co., of Priay, (Ain,) for improvements in wax candles.

Gras Dusart, of Lille, for an improved cornice, in cast-iron.

Wolff and Sirodot Son, of Rothau, (Vosges,) for an improved oven for carbonising wood.

List of Patents

Granted for Scotland subsequent to September 22nd, 1840.

To John Lambert, of 12, Coventry-street, London, (communicated by a foreigner,) for certain improvements in the manufacture of soap.—Sealed 24th September.

James Buchanan, merchant, of Glasgow, for certain improvements in the machinery applicable to the preparing, twisting, and spinning—and also in the mode of preparing, twisting, and spinning of hemp, flax, and other fibrous substances; and certain improvements in the mode of applying tar, or other preservative, to rope and other yarns.—Sealed 24th September.

Alexander Francis Campbell, of Great Plumstead, Norfolk, and Charles White, of the city of Norwich, mechanic, for improvements in ploughs and certain other agricultural implements.—Sealed 29th September.

Armand de Planque, of Lisle, France, now residing at 126, Regent-street, London (communicated by a foreigner,) for improvements in looms for weaving.—Sealed 29th September.

George Delianson Clark, of the Strand, London, (communicated by a foreigner,) for improvements in coke ovens.—Sealed 5th October.

Richard Beard, of Egremont-place, London, (communicated by a foreigner,) for improvements in printing calicoes and other fabrics.—Sealed 7th October.

Robert Beart, of Godmanchester, miller, for improvements in apparatus for filtering fluids.—Sealed 14th October.

Thomas Farmer, of Gunnersbury House, near Acton, for improvements in treating pyrites to obtain sulphur, sulphurous acid, and other products..—Sealed 14th October.

New Patents

SEALED IN ENGLAND.

1840.

To Frederick Payne Mackcleon, of Birmingham, for certain improved thrashing machinery, a portion of which may be used as a means of transmitting power to other machinery.—Sealed 1st October—6 months for inrolment.

Thomas Joyce, of Manchester, ironmonger, for a certain article which forms or may be used as a handsome knob for parlour and other doors, bell pulls, and curtain pins,—and is also capable of being used for a variety of useful and ornamental purposes, in the interior of dwelling houses and other places.—Sealed 1st October—6 months for inrolment.

William Henry Fox Talbot, of Lacock Abbey, Wilts, Esquire,—for improvements in producing or obtaining motive power.—Sealed 1st October—6 months for inrolment.

William Horsfall, of Manchester, card maker, for an improvement or improvements in cards for carding cotton, wool, silk, flax, and other fibrous substances.—Sealed 1st October—6 months for inrolment.

James Stirling, of Dundee, engineer, and Robert Stirling, of Galsten, Ayrshire, D. D., for certain improvements in air engines.—Sealed 1st October—6 months for inrolment.

George Ritchie, of Gracechurch-street, and Edward Bowra, of the same place, manufacturers, for improvements in the manufacture of boas, muffs, cuffs, flounces, and tippets.—Sealed 1st October—6 months for inrolment.

James Fitt, senior, of Wilmer Gardens, Hoxton Old Town, Middlesex, manufacturer, for a novel construction of machinery, for communicating mechanical power.—Sealed 7th October—6 months for inrolment.

John Davies, Agent to Messrs. Newton & Berry, of the Office for Patents, Manchester, civil engineer, for certain improvements in machinery or apparatus for weaving,—being a communication.—Sealed 7th October—6 months for inrolment.

Thomas Spencer, of Liverpool, carver and gilder, and John Wilson of the same place, lecturer on chemistry,—for certain improvements in the process of engraving on metals, by means of voltaic electricity.—Sealed 7th October—6 months for inrolment.

Thomas Wood, the younger, of Wandsworth-road, Clapham, gentleman, for improvements in paving streets, roads, bridges, squares, paths, and such like ways.—Sealed 7th October—6 months for inrolment.

Charles Payne, of South Lambeth, gentleman, for improvements in salting animal matters.—Sealed 13th October—6 months for inrolment.

Robert Pettit, of Woodhouse-place, Stepney-green, gentleman, for improvements in rail-roads, and in the carriages and wheels employed thereon.—Sealed 15th October—6 months for inrolment.

Henry George Francis, Earl of Ducie, of Woodchester Park, Gloucestershire; Richard Clyburn, of Uley, engineer; and Edwin Budding, of Dursley, engineer, both in the county of Gloucester, for certain improvements in machinery for cutting vegetable and other substances.—Sealed 15th October—6 months for inrolment.

William Newton, of the Office for Patents, 66, Chancery-lane, civil engineer, for an invention of certain improvements in engines, to be worked by air or other gases,—being a communication.—Sealed 15th October—6 months for inrolment.

James Hancock, of Sidney-square, Mile-end, civil engineer, for an improved method of raising water, and other fluids.—Sealed 15th October—6 months for inrolment.

Henry Pinkus, of Panton-square, Esquire, for an improved method of combining and applying materials applicable to the formation or construction of roads or ways. —Sealed 15th October—6 months for inrolment.

Charles Parker, of Darlington, flax spinner, for improvements in looms for weaving linen and other fabrics, to be worked by hand, steam, or any other motive power.—Sealed 22nd October—6 months for inrolment.

Richard Edmunds, of Banbury, gentleman, for certain improvements in machines or apparatus for preparing and drilling land, and for depositing seeds, or manure therein. —Sealed 22nd October—6 months for inrolment.

Thomas Clark, of Wolverhampton, iron-founder, for certain improvements in the construction of locks, latches, and such like fastenings, applicable for securing doors, gates, windows, shutters, and such like purposes,—being a communication.—Sealed 22nd October—6 months for inrolment.

Gabriel Riddle, of Paternoster-row, stationer, and Thomas Piper, of Bishopsgate-street, builder, for a certain improvement or improvements on wheels for carriages, for the term of 7 years, from the 11th October instant,—being an extension of original letters patent, granted to Theodore Jones, of Coleman-street, accountant, and by him assigned to the said G. Riddle and Thomas Piper.—Sealed 22nd October—6 months for inrolment.

In our last Number there is a mistake in the Notice of Messrs. Fourdrinier's Patent.—It ought to read as follows:—

To George Henry Fourdrinier, and Edward Newman Fourdrinier, both of Hanley, *in the County of Stafford*, paper makers, for an invention of certain improvements in steam-engines, for actuating machinery, and in apparatus for propelling ships and other vessels on water.—Sealed 17th September—6 months for inrolment.

CELESTIAL PHENOMENA FOR NOVEMBER, 1840.

D.	H.	M.	
1			Clock after the sun, 16m. 17s.
	—		☽ rises 1h. 30m. A.
	—		☽ passes mer. 5h. 28m. A.
	—		☽ sets 9h. 34m. A.
2	1	4	☽ in □ or first quarter.
5			Clock after the sun, 16m. 14s.
	—		☽ rises 2h. 31m. A.
	—		☽ passes mer. 8h. 27m. A.
	—		☽ sets 1h. 20m. M.
		46	Her: in conj. with the ☽ diff. of dec. 3. 5. S.
8	23	29	☿ greatest hel. lat. S.
9	5	52	Ecliptic oppo. or ○ full moon
	—		Occul ε in Arietis im. 3h. 16m. em. 3h. 53m.
10			Clock after the sun, 15m. 53s.
	—		☽ rises 4h. 11m. A.
	—		☽ passes mer. Morn.
	—		☽ sets 8h. 27m. M.
	19		☽ in Perigee.
11	22	43	☿ greatest elong 22. 31 E.
12	18		♂ greatest hel. lat. N.
	—		Occul 37 Geminorum im. 19h. 10m. em. 19h. 43m
13	13	13	♀ in conj. with the ♄ diff. of dec. 2. 23. S.
15			Clock after the sun, 15m. 10s.
	—		☽ rises 10h. 22m. A.
	—		☽ passes mer. 5h. 6m. M.
	—		☽ sets 0h. 55m. A.
16			♂ in conj. with Juno, diff. of dec. 5. 26. S.
	—		Mercury R. A. 16h. 59m. dec. 25. 12. S.
	—		Venus R. A. 17h. 32m. dec. 24. 39. S.
	—		Mars R. A. 11h. 31m. dec. 4. 52. S.
	—		Vesta R. A. 18h. 35m. dec. 24. 27. S.
	—		Juno R. A. 11h. 31m. dec. 0. 34. S.
	—		Pallas R. A. 19h. 8m. dec. 1. 50. N.
	—		Ceres R. A. 20h. 14m. dec. 28. 13. S.
	—		Jupiter R. A. 15h. 45m. dec. 19. 7. S.
	—		Saturn R. A. 17h. 20m. dec. 22. 2. S.
	—		Georg. R. A. 23h. 11m. dec. 6. 3. S.
	—		Mercury passes mer. 1h. 16m.
	—		Venus passes mer. 1h. 49m.
	—		Mars passes mer. 19h. 47m.
	—		Jupiter passes mer. 23h. 59m.
	—		Saturn passes mer. 1h. 37m.
	8	54	☽ in □ or last quarter
17			Occul q in Leonis em. 12h. 28m. im. 13h. 19m.
	—		Occul 76 Leonis, em. 13h. 22m. im. 14. 22.
18	4	16	♂ in conj. with the ☽ diff. of dec. 4. 43. N.
	7	50	♀ in Aphelion.
20			Clock after the sun, 14m. 6s.
	—		☽ rises, 3h. 34m. M.
	—		☽ passes mer. 8h. 56m. M.
	—		☽ sets 2h. 4m. A.
	—		Occul 83 Virginis im. 17h. 13m. em. 18h. 17m.
21	4	34	♃ in conj. with the ☉
	21	15	☿ stationary.
23	12	49	♃ in conj. with the ☽ diff. of dec. 5. 45. N
24	2	12	Ecliptic conj. or ● new moon
	22	22	☿ in conj. with the ☽ diff. of dec. 3. 33. N.
25			Clock after the sun, 12m. 42s.
	—		☽ rises 9h. 32m. M.
	—		☽ passes mer. 0h. [illegible]m. A.
	—		☽ sets 4h. 13m. A.
	6	45	♄ in conj. with the ☽ diff. of dec. 5. 25. N.
	12		Her: stationary.
26	0		☽ in Apogee.
	11	56	♀ in conj. with the ☽ diff. of dec. 1. 51. N.
27	22	50	☿ in the ascending node.
30			Clock after the sun, 10m. 59s.
	—		☽ rises 0h. 10m. A.
	—		☽ passes mer. 4h. 58m. A.
	—		☽ sets 9h. 48m. A.
	—		Occul d² Capricornus, im. 6h. 11m. em. 7h. 27m.

The Satellites of Jupiter are not visible this Month, Jupiter being too near the Sun.

J. LEWTHWAITE, Rotherhithe.

THE

London

JOURNAL AND REPERTORY

OF

Arts, Sciences, and Manufactures.

CONJOINED SERIES.

No. CVII.

Recent Patents.

To George Hanson, *of Huddersfield, in the county of York, Plumber and Brazier, for his invention of certain improvements in the construction of cocks or taps for drawing off fluids.*—[Sealed 7th November, 1839.]

These improvements in cocks or taps for drawing off fluids, are comprised under the four following heads:—first, in certain peculiar constructions of the barrels or cylinders of cocks and valves; second, a novel mechanism for working the plug or cylinder of a valve or cock; third, the adaptation of cupped leather packings to cocks or valves; and fourth, a novel mode of forming elastic metallic packings.

In Plate XI., fig. 1, represents a longitudinal section of a stop cock. *a, a,* and *b, b,* are two tubes or cylinders, connected together in the middle by a screw, extending from the end of one taking into the end of the other, and

having a leather collar and packing between. A flange, at the outer end of each cylinder, is for attaching them to the conducting pipes, through which the liquor is to flow.

On the outside of these cylinders, a tube *c*, *c*, is made to slide, for the purpose of opening or closing the apertures or ways for the flow of the liquor. This outer tube *c*, is rendered tight on the outer surface of the cylinders *a*, and *b*, by a packing of leather *d*, *d*, forced up to their bearing by screw collars; and the tube *c*, is slidden to and fro, by the rotary movement of an axle *e*, and crank arm *f*. The handle or winch, by which the cock is to be worked, being placed upon the square end of the axle *e*, the crank arm *f*, may be moved round in the arc, shewn by dots. The end of the crank arm *f*, is connected to a rod *g*, which moves upon a pivot in a stud *h*, fixed to the flange of the cylinder *a*; hence, as the crank is moved in its arc to one or other of its angular positions, the outer tube *c*, will be slidden along the outer surface of the cylinders.

Supposing the sliding tube *c*, to be in the position shewn in the figure, the liquor from the cylinder *a*, will pass through the lateral openings *z*, *z*, into the cavity *y*, *y*, in the sliding tube, and from thence will proceed through the lateral openings *x*, *x*, into the cylinder *b*, and flow on, by a conducting pipe, to its destination. On bringing the crank arm *f*, to the reverse position, the tube *c*, will be slidden forward until the internal flanges *w*, *w*, are brought up against the stop or packing *i*, *i*, when the flow of the liquor will be cut off from the cylinder *a*, *a*, through the opening *z*, *z*, and consequently the way of the fluid closed.

Fig. 2, is also a longitudinal section of a bib cock, in which the end of the cylinder is enclosed within a tube *b*, *b*, and the sliding valve *c*, is placed between them. A crank arm *f*, is worked by a winch or handle on the outside, which moves it in the arc, shewn by dots. The end of the crank

is connected to the sliding tube *c*, by a rod *g*, and the tube *c*, is thereby moved to and fro, to open and close the liquor way from the cylinder *a*, through the openings *z*, *z*, to the discharge tube *b*,—the end of the cylinder being stopped or closed.

Fig. 3, is a longitudinal section of another construction of stop-cock, something like fig. 1,—the cylinders *a*, and *b*, being in one piece, and having a partition in the middle. The liquor flows from the cylinder *a*, through the lateral openings *z*, *z*, *z*, into the outer tube *c*, *c*.—This tube, sliding on the outside of the cylinder *a*, *b*, has two internal compartments *y*, *y*, and *w*, *w*, which are separated by the leather packings *v*, *v*, confined between flanges, as seen. In the position of the sliding tube, shewn in this figure, the water way is closed, its passage, from the chamber *y*, *y*, being stopped by the packing leathers *v*, *v*; but when the outer tube is slidden back, so that the ingress passages *z*, and egress passages *x*, *x*, are both open to the chamber *w*, *w*, then the liquor flows freely through from the cylinder *a*, to the cylinder *b*, and onward.

Fig. 4, shews another modification of a stop-cock, in which a straight cylinder *a*, *b*, is made to slide within the pipes or tubes *d*, *e*, and the cylindrical box *c*, *c*, which connects the tubes *d*, *e*, together. The sliding cylinder has lateral apertures *z*, *z*, *z*, communicating with the interior of the box *c*, *c*, and a stationary plug or piston *f*, is placed within the cylinder, for the purpose of dividing it into two compartments, and occasionally stopping the appertures *z*, *z*, so as to prevent the liquor from flowing from the cylinder *a*, into *b*. The plug or piston *f*, is held by an arm *g*, extending from a transverse bar *h*, which is confined across the end of the box *c*, and passes through an aperture in the cylinder. In the arm *g*, an axle *i*, is mounted, which passes also through openings in the cylin-

der, and carries a crank-arm *k*, connected by a rod *l*, to a bridge-piece *m*, fixed in the end of the sliding cylinder.

The axle *i*, which extends to the outside of the cylindrical box *c*, being turned, the crank-arm will move in the arc, shewn by dots, and cause the rod *l*, to slide the cylinder *a*, *b*, to and fro. In this figure, the ways *z*, are shewn open; but when the crank-arm is in the reverse position, the apertures *z*, *z*, *z*, will be brought against the plug, and the flow of the liquor effectually stopped by shutting up the communication between the box *c*, and the further end of the sliding tube, marked *b*.

My improved mechanism for working the plugs or cylinders of liquor-cocks, is shewn in the drawings, at figs. 5, 6, 7, 8, 9, and 10. Figs. 5 and 7, are external elevations of a cock, with the improved mechanism attached thereto. Fig. 6, is a vertical section of the same. *a*, *a*, is the barrel. cylinder of the cock; *b*, *b*, is the cylinder, which is made to move up and down within the barrel, between cupped leather packings *c*, *c*. The manner of raising and depressing the cylinder, is one of the subjects of novelty in this invention. The upper end of the plug is attached to a rod *e*, which has a cross head *f*, *f*, above. From the outer part of the cylinder, two arms *g*, *g*, extend, which are hollowed to form spherical sockets for the balls *i*, *i*, at the ends of the bent rods *h*, *h*; and the upper ends of these bent rods are hooked on to eyes at the ends of the cross-head *f*.

The position of the cylinder, shewn at fig. 6, is such as to shut off the liquor, that is, to prevent its passing from the pipe *k*, to the nozzle *l*; but, by turning the bent arms *h*, *h*, with the rod *e*, into the positions, shewn in the external elevation and vertical section, figs. 8 and 9, the cylinder *b*, will be drawn up, as seen in fig. 9, and the liquor allowed to flow through openings *z*, *z*, and discharge itself at the nozzle *l*, below.

In the construction of large cocks, I sometimes use a shorter cylinder, as shewn in the vertical section, fig. 10, and adopt a thimble or shorter tube *m*, with a stem *n*, upon which the lower part of the cylinder *b*, slides. The advantage of this thimble is, that the lower packing leather is always kept expanded and tight; for, when the cylinder descends, its lower part presses against the thimble, and pushes it down at the same moment that the cylinder enters the packing, and thereby prevents the packing from collapsing; and when the cylinder rises again, the thimble is raised again by the stem *n*, into the position shewn.

The third feature of my improvement, is the adaptation of cupped leather packings to the working parts of cocks and valves, either internally or externally, not only in the situations shewn in the several figures, but whenever they may be applicable; which, when hardened by heat, I find to be a more tight and enduring packing than any that has been heretofore employed, for the purpose of water or beer cocks.

Lastly,—my elastic metallic packing is formed by binding a curved strip of thin plate metal round a cone. Fig. 11, shews the form of a strip of thin plate metal, which I employ for producing my packing. The dimensions must of course depend upon the size of the cone, and of the cylinder in which it is to be applied. Fig. 12, is a section of a cock or tap, with two of these elastic packings applied thereto, at *a*, and *b*,—the packing *a*, being for the external packing of the cylinder, and that at *b*, for the internal packing of the same.

Figs. 13, 14, and 15, are detached views of this improved packing. Fig. 16, shews a method of protecting the packing from expanding when lifting out of the cylinder, either in leather or metal.

Fig. 17, is a sectional view, shewing the metallic packing and manner of working another hot water or steam cock,

the packing of which is wound round a cone, commencing with the small end, and concluding with the broad one. This packing I either use alone or in conjunction with any fibrous material, firmly wove; the outside covering of the fibrous packing is cut circular, the inside one straight; the two, when coiled to their proper diameters, are stitched together at the top, and the metal slidden between them, and pressed to their place by the screw tubes.—[*Inrolled in the Rolls Chapel Office, April,* 1840.]

Specification drawn by Messrs. Newton and Berry

To William Crofts, *late of Lenton, but now of Radford, both in the County of Nottingham, mechanic, for his invention of certain improvements in certain machinery, for manufacturing bobbin net lace.*—[Sealed 11th February, 1833.]

These improvements consist in a new mode of producing ornamental spots upon bobbin net, which spots are formed while the lace is in the progress of fabrication, by means of coiling up and accumulating certain of the threads into masses, so as to produce spots, at such parts of the plain net, as are required to form the intended pattern.

The invention is an application of peculiarly jointed wires, in conjunction with hooks, for catching the threads, which are to be looped up, in order to form spots with certainty and facility; the action of the hooks, being aided by the pointed wires, enables the machinery to perform without interruption the backwards and forwards swinging motions, which are usually given to the bobbins and carriages, in circular comb rotary machines.

Plate XII., fig. 1, represents the operating parts of the

lace machine, taken in transverse section. When the spots are about to be formed, the front working points K, are drawn towards the front of the machine, out of their working position, and remain in a state of inactivity during the formation of the spots. The bobbins A,* and B,* with their threads *a*,* and *b*,* intended to form the spots, are then selected by the pushers 3, and projected forward, out of their places in the back combs E, into the front combs D. The bobbins A, and B, not used for forming the spots, are locked in the back combs E, during the spotting operation, by the blade *f*, on the back locker bar F. There is likewise another blade 2, attached to the collars 8, on the locker bar, by means of which the bobbins A,* and B,* can be locked in the back combs E, when required. The locker bar F, receives motion from a lever *g*; and the collars 8, receive motion from a lever 10;—both levers are worked by cams, not shewn in the drawing. There is another locker bar F*, for working the carriages in the front combs D.

The pointed wire bar 7, and the hook bar 13, are attached to the lever 14, by the same pin, but may receive slight shogging motions, the one independent of the other; they are raised and depressed by the lever 14, which receives its motion from various other levers and cams, not shewn.

The pointed wires 6, and the hooks 1, are represented descending amongst the bobbin threads, which are pressed on one side by the pointed wires 6, in order that they may be caught by the hooks 1; and these, on ascending, loop the threads around the grooved back points G, and the additional back points 5; at the same time the bobbin threads, by a peculiar movement, are whipped twice round their respective warp threads.

The back points G, lie below the additional back points 5, which enter into the grooves in the points G, and assist in

making the spots, and keeping them in correct form. Their manner of application is shewn in the figure, the points G, being withdrawn as soon as the spotting is effected; leaving the points 5, in the centre of the spots, in order to retain them in their places, until the points G, are again inserted between the threads, beneath the spots.

The bar *g*, of the grooved back points G, is attached to the lever *h*, by which it is worked; and the bar 11, of the additional back points 5, is attached to, and worked by the lever 12. The front points K, are attached to, and worked by the lever M. H, is the front driving bar, and I, is the back one.

The bars of the front and back guides, for the warp threads, are marked *t*, *t*. The wire and hook-bars, 13 and 7, are guided up and down in front of the warp threads, by the point of a guage-screw 21, bearing against the inclined face of a fixed conducting guide 22, fastened to the top bar of the framing.

The particular features of invention claimed, are the points and hooks above described, for selecting and drawing up the threads; the application of additional back points, and grooved back points, in the manner herein explained, for the purpose of keeping the spots and meshes of the net in correct form, and also in arranging the various parts of the additional machinery, which is requisite for working spots in bobbin net lace; also in combining such arranged spotting machinery, with the usual parts of rotary machinery, in the manner herein explained; so that the spotting machinery may be put in action to produce pattern in the lace, by the same rotary impulse which causes the plain net to be made, through the ordinary evolutions of the machinery, to which the spotting apparatus is appended; and also in arranging, in like manner, the various parts of spotting machinery, so as to dispense

with any selection of particular bobbins and carriages, out of the complete rows of bobbins and carriages; and combining such arranged spotting machinery with the ordinary fluted roller machinery, in the manner herein described.

The improvements, shewn in fig. 2, consist in combining the arranged spotting machinery with ordinary fluted roller machinery. In fluted roller machinery, no selection can be made of the bobbin carriages, which are to be used in spotting; because all the carriages must go backwards and forwards, in complete rows; therefore, whilst the spotting is going on, all the warp threads must remain motionless, without shogging, except those particular warp threads which are hooked up to form the spots. To effect the shogging of particular warp threads, four extra series of guides and guide-bars, marked *w*, *x*, *y*, *z*, are provided, and are applied close against the ordinary guide-bars *t*, *t*, in the usual manner of applying extra guide-bars, for selvage threads. A racking or shogging motion is given to two of these extra guide-bars, at each time of spotting. In this arrangement, the pointed wires 6, must have two prongs, to include between them the warp thread, intended to form the spot. One of the said prongs will then bend aside the warp thread included between them, so as to bear it into the hook 1, and keep it securely in the hook, whilst it is going up to the points. The warp threads, which are intended to be caught or hooked up, are conducted through the eyes of the extra guides *w*, *x*, *y*, and *z*, and are supplied from two extra warp rollers, one to each pair of guides. The warp roller, which supplies the other ordinary warp threads, is shewn at S.

The fluted rollers R, which drive the bobbin carriages, are turned by a toothed sector or fan, (in the usual way,) taking into toothed pinions, attached to their extremities.

The action is so nearly the same, whether warp threads or bobbin threads are to be taken up, that further explanation is unnecessary.—[*Inrolled in the Rolls Chapel Office, August*, 1833.]

To William Crofts, *late of Lenton, but now of Radford, both in the county of Nottingham, mechanic, for his invention of an improved mode of combining together and actuating certain parts of machinery, already known and used for making lace, commonly called bobbin net.*—[Sealed 11th February, 1833.]

This invention is an improved mode of combining together and actuating certain parts of machinery, already known and used for making bobbin net lace, by means of which, two thicknesses, or tissues, or webs of lace net, may be made together in the same machine; that is to say,—the lace net, which is made in the machines, by twisting together the bobbin threads, and warp threads, after being formed into regular meshes by the taking-up action of the points, is wound or rolled up around the lace roller, as fast as it is made; which lace will consist of two thicknesses, in close contact, the successive rows of meshes of both nets having been gathered up together like one net, by the said taking-up action of the points. When such lace net is afterwards unrolled and removed from off the roller, it can be separated into two distinct pieces of lace net.

This improved mode may be carried into effect, by parts of fluted bar or fluted roller machinery, which is so called, because the bobbins and carriages are moved backwards and forwards, in the combs and between the warp threads,

by means of revolving fluted rollers, the flutes of which act between corresponding teeth, formed at the under side of the carriages, in the same manner as the teeth of pinions act in the teeth of cog wheels; or it may be carried into effect, by parts of circular comb machinery, the bobbins and carriages of which, are moved in the combs by the joint action of what are called swinging driving bars, situated above the combs, and lockers, situated beneath the combs, turning on centres, which lockers catch projecting nibs, at the under sides of the carriages, and draw them out from between the warp threads, into the opposite combs to those from which they have been projected, by the previous action of the driving bars.

Plate XII., fig. 3, represents the mode of operating by means of fluted roller machinery. The bobbin carriages A, and 7, have teeth at their under parts, to be acted upon by the flutes of the rollers C, D, and 1, in order to move the said carriages backwards and forwards in the combs E, F, and 2.

These combs have tangs, projecting from them at each end, which are cast in leads to hold the combs together; the lead at one end of each comb, being adapted to be screwed against the comb-bars G, H, and 3, as usual, in fluted bar machinery; but the leads 4, by which the extra tangs, at the opposite ends of the combs are united, are for the purpose of retaining the combs steadily at their proper distances asunder.

The fluted rollers C, D, 1, which drive the bobbin carriages, are situated beneath the middles of the combs E, F, 2, respectively, in the arches which are left between the tangs, and are supported on pivots at their ends, in the usual manner of fluted bar machinery; each of the rollers being steadied in the middle of their length by bearings *a*, *b*, 5, to prevent them from bending or springing.

The guides B, 6, for the warp threads, are cast in leads, and screwed on guide bars I, 8. These guides, instead of being close together, as usual in fluted bar machinery, are placed so far apart that the middle row of combs 2, are included between the two rows of guides, in order that the carriages A, or 7, may pass completely out, from between one row of warp or guide threads, before the same carriage makes its entrance between the other row of warp or guide threads; whereas, in common fluted bar machinery, the carriages must pass between both rows of warp threads at once.

The guide-bars I, 8, are capable of shogging endways, in order to rack the warp threads, as usual in other machines. The racking is effected by a lever Z, actuated by a cam, by which lever the middle comb bar 3, is racked endways when required, to produce the traversing of the bobbins.

The bobbins and carriages, combs and guides, are made single tier guage, instead of double tier guage, as usual in common fluted bar machinery.

The middle fluted roller 1, is supported on pivots at each end in bearings affixed to the end of the middle comb bar 3, so that the fluted roller 1, will partake of the racking motion of the middle comb bar. Each extremity of its fluted part is provided with what is commonly called a turn-again piece, of the same kind as is commonly used, at one end of each of the innermost rollers, in ordinary fluted bar machines, for permitting the turn-again of the carriages; that is, their transfer from one row to the other, at the ends of their respective rows.

Owing to the short length of the combs, and to their being connected by lead at each end, it would be difficult to take out carriages from the combs when required; therefore, to permit of drawing out the carriages, at the

open ends of the combs, the two rollers C, D, are each supported in sockets 11, 11, which are fastened in the manner of short crank bar arms, to each end of horizontal axles or spindle bars 10, 10, placed parallel to the comb bars.

Each of the axles 10, are supported on pivots, so as to be capable of turning a little round, in order to let down the fluted roller, as much as may be requisite, to disengage them from the teeth of the carriages, in order to set the same at liberty, and permit them to be drawn out at the outer or open ends of the combs.

The pivots, at the end of the crank bars, are supported in bearing sockets, which are fastened to the ends of the comb bars; and they may be steadied in the middle by a suitable support, fixed to the middle of the comb bar.

When the fluted rollers C, D, are let down, the carriages must be prevented from sliding down by their own weight in the combs E, or F, and entangling among the warp threads. For this purpose, the flat bars 12, 12, are slidden upwards against the inside flat surfaces of the comb bars G, and H, to which they are held by screws, passing through upright slots in the bars, and fixed into the comb bars; thus, the bars 12, 12, are enabled to be slidden upwards on the screws, in order that their upper edges may raise the under side of the carriages, and stop.

The bars 12, must be raised up to the carriages at the same instant that the fluted rollers are let down, which is effected by a small elbow lever 13, poised upon a centre pin 14. The lower arm of each elbow lever 13, has a notch or opening in its end, to receive a flange at the lower edge of the bar 12; and the upper arm of the elbow lever 13, has also a notch or opening in its end, to receive a tooth at the end of a short arm 15, which projects out from the crank bar axis 10, and acts in the manner of a short lever to raise up the flat bar 12, by moving the elbow lever 13.

When the fluted rollers are raised up again, the bar 12, is withdrawn by the same movements.

Rotary motion is given to the fluted rollers C, D, 1, by a sector L, taking into pinions at the end of the axle of each roller. The sector L, hangs loosely upon one of the main centre pins, and is moved backwards and forwards, with a vibrating or pendulous motion, by means of a link *d*, from the upper end of a lever behind the machine, which receives its power from a pair of cog wheels, put in motion by hand power.

The warp threads for both pieces of the double net, may be supplied from one large warp roller, such as is commonly used in other lace machines, instead of the two marked K, and 9.

The mode of operating in circular comb machinery, is shewn in fig. 4. The combs are placed in three rows, as before described, but their shape is rather different, because the lockers, which are to act beneath them, will not permit of having projecting tangs, at the end of each comb. The middle comb 2, has the tang in the middle of its length, and the back and front combs, have their tangs at their ends.

The form of the carriages are similar to those used in circular comb machines, with two nibs or teeth, at the under side of each carriage, for the blades *c, d*, of the lockers, to take hold of.

The lockers C, D, are the same as in common circular comb machinery, and are placed beneath the front and back combs E, and F, in a suitable position for their blades *c, d*, to catch the outer teeth of the carriages, which are pushed into the combs over the lockers, so as to draw out those carriages, from between the warp threads, when the blades of the lockers are turned upwards; but when they are turned downwards, their acting edges descend below the

range of the nibs of the carriages, and allow the nibs to pass over them.

There are, likewise, two other lockers 22, 19, with blades 21, 20, which assist in passing the carriages out of the centre combs; they are raised by the upright sliding rod 23, which supports the sockets of the lockers; *y*, and *z*, are links, attached to the locking lever.

The driving bars L, M, are the same as are used in circular comb machinery, and act with a vibrating or pendulous motion, to push the carriages along in their combs, and pass them between the warp threads. But the driving bars L, M, cannot push the carriages quite through the warp threads,—therefore, as soon as the nibs of the carriages, which are foremost, get far enough over the blade of that locker, situated at the opposite side of the warp threads, then that locker is turned up, and its blade will draw those carriages quite through the warp threads.

The patentee claims the improved mode, herein described, of combining parts of machinery for making lace, so as to have a row of middle combs, with a row of warp threads on each side of those middle combs, whereby one row of carriages may be passed entirely through one row of warp threads, before those carriages arrive at the other row of warp threads; and of actuating the parts of machinery, for making lace, with suitable racking movements, to cause the said parts to make a double web or tissue of lace net, in the manner herein described; which, when taken out of the machinery, can be separated into two distinct pieces of lace net, by cutting the turn-again traversing bobbin threads, by which the borders or edges of the piece of double net were united together, during its fabrication in the machinery.—[*Inrolled in the Inrolment Office, August*, 1833.]

To James Smith, *the younger, of Radford, near Nottingham, mechanic, and* Francis Smith, *of the same place, mechanic, for their invention of certain improvements in certain machinery for manufacturing lace, commonly called bobbin net lace.*—[Sealed 15th April, 1833.]

These improvements relate to the machinery, commonly called circular comb, and circular bolt machinery, which are of the class denominated double tier traverse bobbin machinery, because the bobbins and carriages are disposed in two rows, for the purpose of passing one of those rows between the warp threads, before the other row is passed, and traversing the two rows of bobbins when required, in order to cross their threads for the purpose of forming the tops and bottoms of the hexagonal meshes of the net, or bobbin net lace.

In such circular comb machinery, the two rows of bobbins and carriages are both moved alternately backwards and forwards in the combs, by means of what are called driving bars or swing bars, applied above the said combs.

These driving bars vibrate or swing backwards and forwards, for the purpose of pushing or driving the two rows of carriages before them, out of one row of combs, and between the warp threads, into the opposite row of combs; or the same may be done by means of lockers, moving on axles; which lockers, being applied beneath the combs, take hold of suitable teeth, projecting downwards from the under parts of the carriages, and thereby push the carriages home, after they have been projected partly through between the warp threads, and lock them securely upon the combs whilst the warp threads are racked sideways.

In all such machines, the carriages of one row are required to give motion to the carriages of the other, by

pushing forward those which stand before them in the combs, by an actual contact of the carriages, edge to edge.

These improvements consist in substituting, in place of the two ordinary driving bars of circular comb machinery, two bars, with blades; and in forming the carriages of the bobbins, with suitable notches and "ears," at each end, in order that the notches of the bobbin carriage may be acted upon by the edges of the blades of the catch-bars, and be moved backwards and forwards in the combs whenever the catch-bars swing or vibrate.

It is to be observed, that driving bars, used in the ordinary lace-making machines, are only capable of pushing or driving the carriages before them to positions between the warp threads; but the improved catch-bars are rendered capable, not only of pushing the carriages towards the warp threads, but also of pulling the carriages through after them, away from the warp threads, into the opposite combs.

Another feature of improvement consists in forming the carriages, with four teeth projecting downwards from the under part of each; there being two teeth at each end instead of only one tooth at each end, as heretofore, in order that the acting edge of the blade of each of the lockers may take into the notch or space between the said two teeth, whereby the lockers are rendered capable of pulling the carriages towards the warp threads, as well as pulling them away from the warp threads; which latter action of pulling is all that ordinary locker blades can perform.

By means of these improvements, the passing of two rows of carriages, one after the other, through or between the warp threads, (giving the necessary racking of those threads, in the interval, after one row has passed through, and before the other has arrived,) can be performed with an uninterrupted vibration or swinging motion of the swing

jacks, and of the catch-bars, without requiring any pause at the middle of that vibration, as heretofore practised in circular comb machines; which was for the purpose of allowing time to draw out the carriages completely from between the warp threads, and to lock them up into the combs, whilst the warp threads are racked.

Plate XII., fig. 7, represents a sectional elevation of the improved machine, taken transversely through the middle; and the following description gives the mode of operating:—

The warp threads having been properly racked, the swing jacks E, with both front and back catch-bars 2 and 6, begin their vibratory motion, moving slowly at first; and at the same time the front locker D, begins to turn down inwards, with a motion; whereby the edge of its blade, acting against the tooth *a*, of the back carriages B, will push those carriages in between the warp threads. Whilst this is going on, the front catch-bar 2, pushes the front row of carriages A, after the carriages B, but with a slower motion; therefore the back carriages B, will run away from the front ones A, and leave a space between them. By this time the back row of carriages B, will have passed through the warp threads, and be taken hold of by the catch 7, when the warp threads are to be racked.

The front carriages A, will now be entering between the warp threads; and the back locker F, beginning to turn up, catches the front teeth of the carriages A, and draws them through the warp threads, which are then again racked; then, without any perceptible pause, the carriages begin to return, by a series of similar movements, beginning with the back locker F.

The swing jacks E, are moved by the link *e*, which connects them with the upper end of a back lever G, which is poised on an axle, in the middle of its length; the lower

end being attached to a connecting rod, with a revolving crank, turning continually round, which makes three revolutions for every row of complete meshes of lace produced by the machinery.

The lockers D, and F, are actuated by cams, one for each locker, which operate alternately, and communicate their motions, by means of levers, to the links Q.—These links are attached to the short lever arms *h*, projecting out from the bars of the lockers.

The racking motions, by which the guide-bars shift the positions of the warp threads, and of the front comb-bar, for traversing the carriages, may be effected in the ordinary way; and also the movements of the point-bars, for taking up the crossings of the bobbin threads, may be produced in the same way as in ordinary circular comb machinery.

Another feature of these improvements consists in making what are called breadths of lace net, by the machinery and improvements hereinbefore described, with the addition of extra catch-bars, and extra lockers.—These additions are for the purpose of making the wide piece of lace net, which is woven in the machinery, in such a manner, that it can afterwards be divided into several narrow breadths, like ribbands, having true selvages, at the two borders or edges of each breadth, which selvages will not unravel.

In making breadths, the turn-again must be performed, by several carriages at a time, viz., by all those which have arrived, by progressive lateral traversing, at the edges or selvages of the different breadths, respectively; hence they are called selvage carriages; which, after they have performed their turn-again, traverse, obliquely, across the width of the lace, in a contrary direction to that in which they traversed before.

Also, it is requisite, in making breadths, to introduce what are called lacing or whipping threads, in order to join the adjacent selvages of the several breadths together, with zig-zag cross stitches, from selvage to selvage, so that the net will form one united sheet, during the process of weaving it, and also in the subsequent finishing.

The whipping threads are supplied from bobbins, which are mounted on carriages, one carriage being placed where every two selvages meet.—These carriages always remain in the same place in the row, being drawn back during the traversing of the carriages. They are worked by the extra catches 15 and 14, and extra lockers 18 and 19; motion being conveyed to these lockers by the levers 26 and 27. The extra selvage guide is shewn at v.

The particular claims set out in this Specification, are—First,—the substitution of catch bars, which act to move the carriages in their combs, by pulling them away from the warp threads, when required, as well as by pushing them towards those threads, when required, in lieu of driving bars, which can only act by pushing; that substitution being made, in combination with lockers, which act by pushing the carriages towards the warp threads, as well as by pulling them away therefrom, when required. The action of the combination being to pass and repass the two rows of carriages, between the warp threads, one after the other, with an uninterrupted swing or vibratory motion, the same as is done in what is called fluted roller machinery, for making wide pieces of bobbin net lace.

Second,—the application to the combination mentioned in the first claim, of extra catch bars and extra lockers, for the purpose of making breadths of bobbin net lace thereby, in the manner herein set forth; with an uninterrupted swing or vibration of the two rows of carriages, following one after the other, between the warp threads; which un-

interrupted vibration has not hitherto been attained in any machinery for making breadths of bobbin net lace.—[*Inrolled in the Rolls Chapel Office, October*, 1833.]

To William Crofts, *late of Lenton, but now of Radford, both in the county of Nottingham, mechanic, for his invention of certain improvements in machinery for making bobbin net.*—[Sealed 4th July, 1833.]

These improvements consist in certain alterations in the structure and mode of working that class of lace-making machinery called the Levers, and the circular comb machinery, for the purpose of making a particular pattern of lace, having large holes, called bullet holing.

In applying these improvements to Levers' machines, the parts called pushers, which are used for dividing the carriages into two ranges, together with the pusher-bars, and all their supports and appendages, must be entirely removed from the landing-bars; because, in the proposed method of working, no traversing of the carriages will be required. The comb-bar wheel, with its bolt and connections for racking the front comb-bar, must also be removed; the front comb-bar being kept stationary by its gauge-screws.

If the machine has been used for making narrow breadths of lace, the turn-again combs and bar are removed, and the back combs cast anew. If it has been used for making only plain net, without bullet holes, the selvage guides are removed from their bars, and their racking wheels also.

The ratchet wheel, on the axles of the racking wheels, which has eight teeth, must be changed for a new one,

with only six teeth ; and the guide-bar racking wheel must be removed, and a new one cut, having three steps or elevations on its circumference. The catch-bar wheels, for lifting and letting fall the catch-bars, are removed ; and others, with three deep notches, are substituted, their ratchet wheels having six teeth.

The number of points are to be doubled, that is, in what is called a ten-point machine,—twenty points are placed in every inch.

The pump apparatus or lever, for lifting and letting fall the back catch-bar, when either of the point-bars come down and go up again, must be disconnected from both point-bars.

Plate XII., fig. 5, represents a sectional elevation, taken transversely through the machine, for the purpose of shewing the forms and positions of the working parts. The ratchet wheel *a*, which usually has eight teeth, must be changed for one with six teeth.—This ratchet drives the notched wheel *d*, which governs the half-way or dividing stop. The said half-way or dividing stop must be adjusted, so as to catch and detain the back landing bar *t*, when the two landing-bars *t*, *u*, are quite down, or closed together, instead of detaining them at a little distance apart, as in the ordinary position, for the divided carriages to be caught by the catch-bars, in ordinary Levers' machines.

The large guide-bar racking wheel must have thirty-six teeth, and the large racking wheels, for the extra guide-bars for bullet holing, must also have thirty-six teeth.

The threads, to form the bullet holes, are provided with the extra guides *m*, *n*, *o*, *p*, which are attached to the usual guide-bar, and each receives a separate racking motion,—the bullet holes being formed by the usual method. A magnified portion of the lace, ornamented with bullet holes, is shewn at fig. 6.

The ratchet wheel *a*, affixed to the notched wheel *d*, is turned by the driver *b*; and in place of driving-bars and lockers, two catch-bars *r*, are applied, their ratchet wheel *s*, being turned by the driver *d*.

The selvages are formed by a strong warp thread, stretched tight, provided by a roller, distinct from the warp roller. In making narrow breadths of lace, bobbin threads are used for whipping threads, the bobbins which furnish them being set rather loose.

In applying these improvements to circular comb machinery, the front comb-bar is kept stationary, and its racking wheel is removed. The points are also doubled in this machine, being changed from ten points to twenty points per inch. The racking wheels are changed for new ones,—one having eight different projections, and the other five, which are turned by a ratchet wheel of twelve teeth.

The patentee particularly claims altering and working Levers' machinery, and circular bolt or circular comb machinery, whether hand machinery or rotary machinery, in the manner herein described, for the purpose of making lace net, either in wide pieces or breadths, and either plain or ornamented by bullet holing, according to the mode herein described.

It is stated, that this lace net will be of a much more simple texture than ordinary bobbin net, being without traversing threads, and therefore can be made more expeditiously. The net, after being made in this machine, is to be washed, bleached, or dyed,—singed with gas, if needed, and ornamented with needle-work, if required, and afterwards finished or stiffened with starch, and got up in the usual manner; it will then present nearly the same appearance to the eye as ordinary bobbin net.—[*Inrolled in the Rolls Chapel Office, January,* 1834.]

To JOHN HEATHCOAT, *of Tiverton, in the county of Devon, lace manufacturer, for his invention of certain improvements in machines or machinery used in the manufacture of bobbin net.*—[Sealed 14th September, 1833.]

THIS invention is an improved mode of inserting the lacing or sewing thread, between the breadths of lace, during the making and finishing of it. In this improved mode, the lacing thread passes in front of the warp thread that forms the selvage, and behind the two bobbin threads which compose the meshes; and then re-passes in front of the warp thread, to the adjoining breadth, on which it acts in a similar manner. Another part of the improved mode consists in ornamenting the lace, by passing the lacing thread round the two bobbin threads, composing the top of the meshes.

In Plate XII., fig. 8, represents, in section, the principal working parts of this machine. *d, d*, are the points; *f, f*, the lockers; *g, g*, the driving-bars; *c, c*, the combs; *e*, the lace roller; *a*, the warp roller; *h, b*, are the ordinary guide bars, with their guides.

The selvage threads are supplied from the roller A, one row of threads passing through the ordinary guides on the ordinary guide-bar *h*, and the other row through the guide *b*, which is attached to the guide-bar *h*. The ordinary warp threads proceed from the roller *a*, through the guides on the guide-bar *b*. The bar E, is called the poppet bar, and has a vertical movement for the purpose of stopping the turn-again carriages, by means of catches on its upper end. The parts by which these improvements are effected are, the guide D, and the lacing thread roller C. The guide D, has a separate racking movement from the other guides.

The patentee claims the mode of inserting the lacing thread, by passing it across the warp threads, and behind the bobbin threads; and likewise the mode of ornamenting the lace, by passing the lacing thread round the bobbin threads, which compose the top of the meshes; but he does not confine the application of this mode to the machine herein described, or to the peculiar machine by which it is effected; nor does he claim the whole, or any part of the machinery, except when employed to effect the above process, as herein described.—[*Inrolled in the Petty Bag Office, March,* 1834.]

To THOMAS FARMER, *of Gunnersbury House, near Acton, in the county of Middlesex, Esquire, for his invention of improvements in treating pyrites and other matters, to obtain sulphur, sulphurous acid, and other products.*—[Sealed 25th February, 1840.]

MY invention consists of treating pyrites, or other substances containing sulphur in a state of combination, by causing them to burn in a furnace, of the description shewn in Plate XIII.; by means of which, they are burnt without the aid of fuel, so as to disengage the sulphur which they contain in its simple state of sulphur, or in the form of sulphurous acid gas. The furnace having been heated, in the first instance, with coals, or with burning pyrites, from a previous operation, is afterwards fed with pyrites, introduced into the door-way, marked A, which is then closed, as is also the door-way B, at the back of the furnace; and the combustion is sustained by the admission of the atmospheric air, by one or other of these door-ways, as is found to be necessary for the more or less perfect

combination of the oxygen of the air with the burning materials, or with the disengaged gas.

In proportion as the burning pyrites run into a clinker, which occurs after it has remained for some minutes at a red heat, it is taken out at the front door A, by the help of a poker and rake, and a fresh charge of pyrites is introduced upon that portion which has not clinkered. The second range of bars or grating C, receives the small pieces of pyrites, which, in charging or otherwise, pass between the upper bars undecomposed, and then they continue to burn till it is deemed necessary to remove the residuum, as well as that which is connected in the ash-hole beneath at D.

The sulphurous acid gas, after passing through a pipe at the top of the furnace, is received into a leaden chamber, and treated in the same manner as sulphurous acid gas, obtained from the combustion of sulphur, in the ordinary process for obtaining sulphuric acid.

The small openings in the doors, are used as well to observe the operation, as to admit air when required.

When it is designed to obtain sulphur rather than sulphurous acid gas, the door-way A, must be entirely closed, except for the introduction of the charges of pyrites; and only sufficient atmospheric air must be admitted by the door-way B, to sustain a slow combustion, the sulphur being collected in the lead chamber, which is connected with the furnace by means of the pipe on the top of the latter;—the occasional admission of vapour, produced by water evaporated from the ash-hole E, facilitates the sublimation of the sulphur. The clinker may be used for smelting, with a view to the extraction of the metal which it contains, or otherwise.

The advantages of this invention consist in the easy means which are thus presented for procuring sulphur and

sulphurous acid gas, from metallic and other sulphurets, by a more simple and cheap process than has hitherto been adopted,—particularly as respects the mode of changing the furnaces, regulating the admission of the atmospheric air, and the withdrawing of the decomposed materials.—[*Inrolled in the Inrolment Office, August,* 1840.]

To JACOB FREDERICK ZEITTER, *of New Cavendish-street, Portland-street, in the county of Middlesex, piano-forte maker, for his invention of certain improvements in piano-fortes, and other stringed musical instruments.*—[Sealed 1st November, 1833.]

THIS invention is an improvement in the construction of the bars for supporting the sounding-boards of piano-fortes, harps, and other stringed musical instruments, whose sounding-boards require the support of bars.

These bars are composed of two or more pieces of wood, securely glued together, which are so shaped, that the fibres of the two pieces shall form inclinations to each other, in such a manner, as to present a greater length of fibres towards the sounding-board, than towards the opposite side; by which, (the patentee says,) greater strength and elasticity in the bars, is obtained from the same substance and weight of material; and hence, the sounding boards, to which they are applied, may be made much thinner and lighter.

In Plate XI., fig. 1, shows the simplest form of one of these improved bars, composed of two pieces of wood, which are firmly glued together.

Fig. 2, represents the next simplest form.—The bar, in this instance, is composed of three pieces of wood, *a*, *b*, *c*; the top ones *b*, and *c*, being glued to the bottom one *a*.

Fig. 3, exhibits another form of bar, composed of four pieces, *a*, *b*, *c*, *d*,—and it will be perceived, that the pieces *b*, and *c*, instead of their whole length being glued to the piece *a*, are only attached at their ends, and there glued to *c*, their other ends being glued to the block *d*, on the thickness of which, (if the relative proportion of the bars to the block is preserved,) mainly depends the extension of this principle.

In applying this bar to the sounding-board of a harp, the bar is reversed, and presents the shortest length of fibres towards the sounding-board.

The patentee claims the exclusive use of bars, so constructed, for the sounding-boards of piano-fortes, and such other stringed musical instruments as require the same, whether applied beneath or above the sounding-board; but if above the sounding-board, then they must be applied in the manner described for the harp; those sounding boards to which these bars are applied, being made much thinner and lighter than usual.—[*Inrolled in the Inrolment Office, May*, 1834.]

To Henry Robinson Palmer, *of Fludyer-street, Westminster, in the county of Middlesex, civil engineer, for his invention of an improvement or improvements in the construction of arches, roofs, and other parts of buildings, and which improvement or improvements may also be applied to other purposes.*—[Sealed 7th November, 1833.]

This invention consists in locking or fastening curvilinear plates together, in order to form an arched, waved, or undulated surface, that will have greater strength than a flat

surface of the same materials; and may be constructed of clay, or other earthy matters of a plastic nature, capable of being moulded and shaped into the required form, and baked in an oven, or otherwise hardened.

In order to join these plates permanently, a cement must be used that will withstand the same heat as the plates. The cement recommended to be employed is composed of lime and bullock's blood. The proportions and mode of mixing the materials for making such a cement is well known, and therefore need not be stated.

Plate XIII., fig. 1, represents, in section or edgewise, a curved plate, the ends A, of which, enter into the joint pieces or sockets, hereinafter described. There are, near the ends of the plate, projections D, for protecting the edges of the joint pieces

Figs. 2, 3, 4, and 5, shew different forms and positions in which the plates may be placed; and also the method in which they may be united by means of the joint pieces F, which can be made of a variety of forms.

Fig. 6, represents an arch, constructed according to this improvement. G, are the side walls of the building, the tops of which may be formed as a coping H, of stone, brick, or any other material, in the shape of an obtuse angle.

The rests, for the spring of the arch, are made of the same material, placed upon this coping, their under parts being formed to a corresponding angle. On the top of the rests I, I, a projection is made to receive the end of the arch, and in which it is secured.

The horizontal thrust of the arch is counteracted by the tie-rod K; the ends of the rod being dove-tailed, in order that it may be held securely in the wall. The number of these ties may be increased, according to the extent of the arch; and there are hooks P, P, to support the gutter, which is to be secured into the walls.

In applying the principle of construction to the formation of walls, for the interior or exterior of buildings, the plates and junction pieces must be made straight, in the direction of their length. — [*Inrolled in the Petty Bag Office, May,* 1834.]

To WILLIAM GRIMMAN, *of* 7, *Camden-street, Islington, in the county of Middlesex, modeller, for his invention of a new mode of wood paving.*—[Sealed 15th April, 1840.]

THE patentee describes his invention in the following manner:—

First, my invention consists in the application of blocks of a certain figure, and formed in a certain manner, or cut according to a certain angle, for the purposes of carriage-road pavements, foot pavements, court yards, coach-house floors, stables, carriage drives, &c.; and the mode by which I propose to carry such invention into effect, is as according to the following method. I take blocks of wood, whose face, cut vertically, form a regular figure; for instance, say a parallelogram, whose longest side is twice its breadth, and its depth equal to its longest side of the face, the sides forming a rhombus or rhomboid of an angle of 77 degrees, or thereabouts; the form or plan whereof is given in Plate XI., and marked A.

And I further claim the invention of the mode of applying these blocks, thus made, to the purpose of carriage-way pavements, &c., and which is thus effected:—I lay down the block No. 1, in the annexed plan, (marked B,) the depths on the sides A, D, forming an inner angle of 77°, and those of the sides B, C, forming an outer angle also of

77°. I then place the block No. 2, with its inner angle E, against the outer angle B, of block No. 1, and its inner angle F, parallel with the inner angle of A, block 1. Block No. 3, is then placed,—its inner angles I, and K, being placed against the outer angles B, and H, of blocks Nos. 1, and 2. No. 4, is then laid down, with its inner angle N, against the outer angle C, of block 1, and the outer angle O, against the inner angle I, of block 3. The block No. 5, follows, with outer angles S, and T, against the inner angles B, No. 1, and N, No. 4. No. 6, is placed against blocks Nos. 1, and 5, with its outer angles against the inner of the before placed blocks 1, and 5. In like manner also block No. 7, is placed. The block No. 1, being then entirely surrounded by those Nos. respectively, 2, 3, 4, 5, 6, and 7, and being equally pressed upon, or equally pressing upon one or more of them, becomes firmly fixed in its situation. In like manner the block No. 4, on being surrounded by blocks Nos. 5, 1, 3, 10, 9, and 8, placed with the same attention to the inner and outer angles, becomes also fixed; and the same principle applies to each single block, until the space to be covered having been filled in this manner, as far as whole blocks will accomplish it, the filling in of the residue is effected by cutting the blocks horizontally, on the side nearest the extremity of the work, to be covered to fit the aperture; and the whole will then form one solid mass.

I also propose to lay these blocks on a concrete foundation, brought to a smooth or level surface, either by a fine concrete or a thin layer of Asphalte, or by laying thin slabs of wood on the concrete.

And I hereby declare the foregoing to be my invention as to the mode and manner of cutting, and also as to the principle of placing the said blocks, for the purposes before specified. And, I further claim the invention of applying

this principle to any block of wood, or blocks of wood, whose vertical end having a regular figure, will by the application of an outer angle on one block to the inner angle of another, and by continuity, form one solid mass by pressing upon, or by equally being pressed upon by the block adjoining, be the angle of inclination more or less than 77°. And I do not claim the privilege of invention to the concrete, or the covering the same with Asphalte, or laying thin slabs of wood on the concrete; and my invention or mode of wood paving, is further shewn or explained by the plans delineated in the accompanying Plate.—[*Inrolled in the Inrolment Office, October*, 1840.]

To CHARLES SANDERSON, *of Sheffield, in the county of York, steel manufacturer, for his invention of a certain improvement in the art or process of smelting iron ores.*—[Sealed 11th October, 1838.]

THE object of my invention of a certain improvement in the art or process of smelting iron ores, is to separate the scoria, slag, or other earthy, or extraneous matters, from the metallic part, in a better and more economical manner, than is commonly practised in the smelting of iron ore; and consists in a novel or improved process, or manner, or method of treating or operating upon the ore, whereby I am enabled to separate and remove the scoria, or earthy matter, contained therein, from the metallic parts, without the necessity of melting both the metal and scoria, or bringing them both into a fluid state, and then running off the fluid iron from the scoria or slag, as is the usual practice in the blast furnace; that is to say,—I treat and operate

upon the ore, in such manner, that I reduce the scoria or other extraneous matters contained therein, to a fluid state, so that the same will separate from the metallic parts and run off, leaving the metal without being melted into a fluid form, the metal being left after the scoria or slag has separated from it, in a sort of pasty consistency, and in a fit state to be removed from the furnace; and also applicable to various purposes, either to the making of bar iron, by puddling, or to be refined, or melted, and cast into "pigs," or any other form required.

Having stated, in general terms, the nature of this improvement, I will proceed to describe the method of carrying my invention into effect; first, referring to the usual manner of operating upon iron ore, to shew the difference between this and my improved process, or manner of treating the same.

In the ordinary operation of smelting iron ores, the ore after having been roasted, is placed, together with the flux and fuel, in a furnace, and submitted to the action of powerful combustion, supported by a continuous blast of air;—the scoria, slag, and other extraneous matters, as well as the metallic parts, thereby become melted into a fluid state, and descend to the lower part of the furnace;—the fluid metal being the heaviest, falls to the bottom, with the fluid scoria or slag lying upon the top of it, which runs off from the metal as it becomes melted, through a hole made in the furnace for this purpose; the fluid metal being run off at a lower aperture, into "pigs," or other forms, as required.

It will thus be seen that both the metal and scoria, or slag, are melted together, and both rendered so fluid, that the metallic parts percolate through the scoria, and fall to the bottom of the furnace; whereas, by my improved mode or method, the scoria or slag *only*, is rendered fluid, and

runs away from the metal, leaving it in a kind of pasty consistency, ready to be used for various purposes. And I will now proceed to describe the manner of carrying this improvement into effect, referring to the drawings annexed; that is to say:—

I take ironstone, of the argillaceous description of iron ores, or any other description of iron ores, be the same rich or poor in metal, or containing more or less of any earth or substance, foreign thereto, commonly called the "matrix"; these ores I subject to the usual process of calcination or roasting; the ore is to be broken small, so that it will pass through a riddle or seive of about half an inch mesh; and thus prepared, is to be mixed with a carbonizing material, such as charcoal, or coke dust, or any other convenient substance, which will produce a similar effect; the quantity may be varied according to circumstances, but I consider the best proportion to be about 10 per cent. (or to every 100 pounds of broken ore, add ten pounds of charcoal or coke dust.) If the ore, in its natural state, contain earths in such proportions as will produce or cause their fusion, at the lowest temperature at which earths so compounded do fuse, then no flux will be required to be added; but if the ores contain, or are composed of earths which do not melt at the lowest temperature, or which are difficult of fusion,—or even if the earths are fusible, but not in the best proportions to effect their separation from the iron, without the necessity of *fusing it also*,—then a quantity of flux is to be added, and combined with the ore and coke dust, in such proportions as will form a mixture, wherein the earthy parts shall be most easily melted;—my object being to effect a complete fusion of the earthy matters or "matrix" of the ore *at as low a degree of heat* as possible, while the *metallic parts* remain *unmelted*, or not in a fluid state. The ores, or

mixture of ore and flux, being prepared, is placed in a roasting furnace, of any convenient construction, for the purpose of driving off the moisture, and rendering it perfectly dry and hot; and in this state it is removed into a reducing furnace, of any convenient construction, where it is to be acted upon, first,—by a low heat, until it has become de-oxidyzed; after which, the heat is to be gradually increased until the ore, with the flux, begin to agglutinate and sink into one mass; the heat is then to be increased more rapidly until the scoria becomes fluid, when the heat is to be kept up equally, and the "eye" or "slag-hole," at the bottom part of the furnace, opened to allow the scoria to run off as it becomes fluid, leaving the metal behind, excepting any small portion which may have combined with the flux scoria or slag during the operation. Should the ore contain matter deleterious to the production of good quality of iron, such as sulphur, arsenic, or phosphorous, I propose to add such substances as are known to counteract these defects with the ore and flux, in the reducing furnace, with a view of removing, wholly or in part, these deleterious substances, and thereby improving the heating of the iron produced.

It will thus be evident, that, although the metallic parts become converted into metal, intermixed intimately with scoria, and also that it is in a pasty state, of greater or less consistency, according to the degree of heat applied, yet the metal is never in a state of complete fusion; thus, all the desired effects, which are produced in the common blast furnace, are produced in this furnace by my improvement, excepting that the metal is never reduced to a fluid state; and these objects are effected without the necessary use of an artificial blast, and at a degree of heat much lower than required in the ordinary blast furnace. The metal, being thus separated from the scoria, is to be removed

from the furnace by tongs, or in any other convenient manner.

I would here remark, that the above effects may be obtained by various modifications of furnaces; therefore, I wish it to be understood, that I do not intend to confine myself to any particular form or construction thereof, and I have shewn in Plate XIII., only such an arrangement as I have found to answer the purpose, and which will serve to illustrate the manner of carrying my improvement into effect.

Fig. 1, is a vertical section of a preparing furnace, wherein the ore is roasted and carbonized, by mixing it with the carbonaceous substance, and acting upon them by heat, the same as in the upper part or chamber of the common blast furnace; fig. 2, is a top or plan view of the same; and fig. 3, a horizontal section, taken in the line a, b, fig. 1.

The furnace is divided into two chambers *a*, *b*, for receiving the ore, or mixture of ore, and carbonaceous materials; which chambers are heated by one fire-place *d*, and separated from each other by the flues and hot-air chambers *c*, leading from the fire-place to the chimney *e*. The furnace is represented as circular; but it may be of any other figure, and is constructed of brick-work and iron, in the usual manner of erecting such works; *f*, *f*, is the main arch of brick-work, upon which the whole structure rests. The outer chamber *a*, is open at the top part for the admission of the ore, or ore and carbonaceous matters, and is furnished with doors *g*, *g*, by which the material, under operation, is removed as it becomes roasted, and is then introduced into the centre or preparing chamber *b*, which is also open at the top, and has a door *h*, by which the prepared ore is removed, as required, into a small iron waggon *i*, or other suitable receptacle, by which it is taken

to the reducing furnace, fig. 4, where the separation of the scoria from the metal takes place.

If the ore is put into the chamber *a*, without any carbonaceous matters, then these materials must be added at the time it is removed from the chamber *a*, (after roasting,) to the centre chamber *b*, where it is carbonized or prepared; but I prefer mixing the ore and the carbonaceous matters together before roasting, and therefore proceed to operate in the following manner:—

The raw ore being crushed small, and mixed intimately with small coke or anthracite coal, and charged into the compartment *a*, becomes sufficiently heated so as completely to drive off the volatile matters by the time it arrives at the bottom, from whence it is, from time to time, removed and raised, by some convenient means, to the mouth of the chamber *b*, into which, while in a heated state, it is to be charged along with any flux the quality of the ore may require. The mixture descends gradually to the bottom of the furnace, and is abstracted by the door *h*, in a state, both physically and chemically, precisely similar to that found in the common blast furnace, at that part of such furnace where the ore and flux are about to combine and fuse together. This prepared ore is then conveyed to the reducing furnace, fig. 4, which may be constructed in many different ways, yet producing similar results. The product of the preparing furnace, as required for the reducing furnace, should possess the following properties, viz:—that the metallic part should contain as little carbon as possible, and the earthy matter, contained in the ore, so associated with the flux, that they may melt and run off, at as low a temperature as possible.

Fig. 4, is a vertical section of a reducing furnace, wherein the operation of separating the scoria from the iron, may be completed.

Fig. 5, is a sectional plan view of the same,—the cover of the reducing chamber being removed. This furnace is also composed of brick-work and iron. *k*, is the reducing chamber, for receiving the previously prepared ore and flux, and is composed of fire-brick, and is heated by being in contact with the fire; and also by the hot air arising from the combustion of fuel in the fire-place *l*, which passes up the flues or hot air chambers *m*, to the chimney at *n*. *o, o*. is the main brick-work surrounding the furnace, and forms the ash-pit below; *p*, is the moveable cover of the reducing chamber, and *q*, the slag-hole, by which the melted scoria is allowed to run off as it becomes fused, leaving the metallic parts behind. On a fresh charge of hot prepared ore being placed in the chamber *k*, the open top is to be closed by the cover *p*, and the fire kept up, as before stated, to the required degree of heat; and when the scoria has all run off, the metal is to be removed in any convenient manner, and further operated upon, or used for any purposes before named, when the reducing furnace will be ready for another charge.

Fig. 6, is a vertical section of another modification of a reducing furnace, in which the same effects may be obtained. The outer casing of this furnace is composed of iron, and the fire-place is of an annular form, surrounding the reducing chamber; and the combustion is produced and maintained by a blast pipe *r*, leading into the ash-pit *s*, instead of a natural draft, as in the former furnace.

Fig. 7, is a horizontal section, taken in the line a, b, in fig. 6; and as the same letters of reference are marked upon corresponding parts, as in the former figures, no further description will be necessary, as the construction and mode of operation will be understood from the drawings and former description.—Or, partly the same effect may be produced, although in an imperfect manner, in the open

furnace, into which blast is introduced, as shewn in the vertical and horizontal sections, figs. 8, and 9, where *a*, is the reducing chamber, formed of brick-work, surrounded with an iron chamber *b*, filled with water, to prevent radiation of heat, or destruction of the brick-work. *c*, *c*, are the "twyere" pipes, leading from the blowing apparatus.

The prepared ore, with the fuel, is placed in the chamber, and the blast turned on, which is to be regulated according to the degree of heat required to cause the scoria to melt, when it will run off at the "slag-hole" *d*, leaving the metal in the chamber, the fuel being consumed and mostly passed off in vapour. Or, the same effect might be obtained by a a modification of the common blast furnace, by attaching a reducing chamber, of this description, at that part of the furnace where the ore or scoria are about to melt, and descend into the usual melting chamber. But, I prefer operating with separate preparing and reducing furnaces, as above shewn and described, as the process of separating the scoria from the metal, is conducted much more perfectly and economically.

If the metal be required for the purpose of making bar iron, by puddling,—or if it is to be used in a refinery, it may be taken in the state in which it comes from the reducing furnace. If wanted for casting, it may be melted from this state,—but if required for sale, as raw material, it would be best re-melted and run into "pigs," or masses; and any kind of furnace will do for this purpose, such as are commonly used for melting pig iron at foundries.

The economy of my improved process is effected by saving the cost of erecting large blast furnaces, steam-engines, and blowing apparatus, similar to those which are at present used for iron smelting, in Staffordshire, South Wales, &c.; and also I derive an additional advantage by my method of operation, as I produce a uniform quality of

metal during the whole time the furnace may be working, the produce being daily the same, and the quantity produced in proportion to the size of the furnace used.

Having now described and ascertained my invention, and the manner of carrying the same into effect, I wish it to be understood, that I am aware that iron ores have been submitted to the chemical process of cementation; and also that the metal, together with the earthy parts, or flux, or scoria, have been, by means of heat, reduced together in a common melting pot or crucible, into a sort of pasty mass or consistency, and a portion of the metal separated therefrom, by puddling or stirring with an iron rod; but this has only been done in a very expensive and wasteful manner, and merely as a chemical experiment, or to obtain testing samples of the ore; and the portion of metal, so separated from the pasty mass, has consequently been mixed up, more or less, with scoria; whereas, by my improved process, the scoria and flux are so operated upon as to cause them to fuse and flow off and separate from the metallic parts without any stirring, puddling, or other mechanical operation; and therefore I claim, as my invention, secured to me by the above in part recited letters patent, the improved mode, or manner, or process of operating upon the earthy or other foreign matters contained in the iron ore, so as to cause them to fuse or melt, and separate from the metallic parts, and run off, leaving the metal behind in the furnace or reducing chamber, as hereinbefore set forth and explained.—[*Inrolled in the Rolls Chapel Office, April,* 1839.]

Specification drawn by Messrs. Newton and Berry.

To Richard Barnes, *of Wigan, in the county of Lancaster, engineer, for his invention of a certain machine or apparatus for producing, by the combustion of gas or oil, heated air for warming the interior of buildings; and which machine or apparatus may be applied, at the same time, to give light.*—[Sealed 19th October, 1833.]

This is a new mode of producing, by mechanical means, heated air for warming the interior of buildings, rooms, lobbies, &c.; the air being heated either by contact with, or passing through flame, or by contact with heated surfaces of metal; and, besides heating the air, the stove may be applied to lighting buildings.

Three different stoves are shewn in Plate XI. Fig. 1, is the section of a stove, applicable to heating air only, by passing the air through flame. Fig. 2, is a modification of the stove which heats the air by passing it through a flame, and likewise producing light. Fig. 3, is a stove for raising the temperature of air, by contact with heated metal surfaces.

The same letters denote similar parts in each figure. *a, a,* is the bottom of the stove; *b, b,* the outer case; *c,* the inner casing;—between these cases there is a space or passage *d, d,* through which a quantity of cold air is conducted, in order to keep the outer case cool.

The air enters at *e,* and passes out at *f*;—these parts are similar in all three stoves. *g,* in fig. 1, is a metal disc, placed above the opening *l*; *i, i,* is an annular flame of gas; and *h,* is an inverted cone. The air rushes in at *l,* against the disc *g,* which directs its current through the flame of gas. The air thus heated, passes into the inverted cone *h,* and thence out at the openings *f, f,* into the apartment.

In fig. 2, the air to be heated, enters at *m, m,* passes through the flame, and into the cone *h,* as in fig. 1; in

place of the opening *l*, a plate of glass *x*, is inserted, the pipe, for the gas, being supported on a shelf above it.

The lower part of the casing, at *s*, of fig. 2, is formed of glass, by means of which the flame *i*, *i*, is made to light the apartment; the glass being kept cool by the cold air passing through the space *d*. An outer covering *y*, is to be slidden over the glass part, by which the degree of light can be regulated.

In fig. 3, *t*, *t*, *t*, are metal chambers, with a jet of gas *j*, at the lower part of them, which extends up their whole length, the gas being supplied by the pipes *k*, shewn in the plan view, fig. 4. The air, for the support of combustion, enters at the apertures *o*, and passes out at the top, through small pipes *c*, into the large pipe *r*, which is provided with a stop-cock *s*. Through the pipe *r*, the rarified air, by this means, may be used for heating an adjoining apartment.

The cold air, entering at *n*, *n*, *n*, is heated, by coming in contact with the exteriors of the chambers *t*, *t*, *t*, whence it proceeds through the apperture *p*, *p*, into the apartment. In using oil, for heating air, strong Argand lamps are substituted for the gas pipes.

The patentee claims the stoves, herein described, for heating air and giving light; but does not restrict himself to the above forms or mode of construction.—[*Inrolled in the Inrolment Office, December*, 1833.]

To WILLIAM GOSSAGE, *of Stoke Prior, in the county of Worcester, manufacturing chemist, for his invention of certain improvements in the processes or operations connected with the manufacture of alkali from common salt, and with the use of the products obtained therefrom.*—[Sealed 17th August 1837.]

THE manufacture of alkali from common salt, by treating

the salt, in the first operation, with sulphuric acid, and in the second operation, decomposing the sulphate of soda, obtained thereby, by means of lime and carbonaceous matter, is well known.

My improvements are, in part, connected with the use of the muriatic acid, obtained during the first operation, above referred to, as part of the processes of manufacturing alkali from common salt, when the said muriatic acid is applied to act on oxide of manganese.

By the action of muriatic acid on oxide of manganese, chlorine gas and muriate of manganese are produced; and, by submitting this muriate to certain processes, hereinafter indicated, I obtain oxide of manganese, which I designate artificial oxide of manganese, of a quality suitable to be applied again, with muriatic acid, for producing chlorine gas.

My improvements are also in part connected with the use of the product obtained by the second operation above referred to, as part of the processes of manufacturing alkali from common salt.

When the crude alkali is lixiviated in the usual way, there remains an undissolved residuum, well known to manufacturers of alkali, residuum or tank refuse. This residuum contains sulphuret of calcium, carbonate of lime, carbon, and some other matters. By the means hereinafter described, I obtain from the alkali residuum sulphuretted hydrogen, and carbonate of lime, which may be used as hereinafter described.

The decomposition of common salt, by means of sulphuric acid, may be effected, for the purposes of my improvements, in any of the apparatus usually employed, which provide for retaining the muriatic acid; but I prefer making use of certain improved apparatus, for which I obtained His late Majesty's royal letters patent, bearing date the 24th day of December, 1836.

One modification of this apparatus, as described in my specification of such patent, which is inrolled in Her Majesty's High Court of Chancery, consists of a condensing chamber, containing siliceous pebbles, in which the muriatic acid gas may be condensed by water alone, yielding liquid muriatic acid, or by a mixture of water with any substance or material on which it is desired that the muriatic acid should effect a chemical action.

When I use the said artificial oxide of manganese (prepared as herein indicated) in this apparatus, I inject a mixture of this oxide and water, and introduce steam, in the manner described in my said other specification; and the oxide being acted upon by the muriatic acid, chlorine gas, and liquid muriate of manganese, are obtained as products, and which may be collected separately, as described in my said former specification. Also, when liquid muriatic acid, obtained by condensing the gas with water alone, is caused to act on oxide of manganese, chlorine gas, and liquid muriate of manganese, are obtained as products.

The liquid muriate of manganese being collected, I decompose it by means of hydrate of lime; and to effect this operation conveniently, I use large shallow open vessels, each vessel having several shafts fitted with paddles, and extending across it, and so arranged, that rapid motion can be communicated to them. I introduce into these vessels a quantity of hydrate of lime, made into cream of lime, and I gradually add the liquid muriate of manganese thereto; and, at the same time, give motion to the shafts and paddles, so as to cause a perfect mixing of the fluids.

I prefer to keep an excess of lime in the mixture, and by the gradual addition of the liquid muriate of manganese, as above pointed out, I reduce this excess to a small proportion at the end of the operation. During this operation, a reaction takes place between the lime and muriate of

manganese, and hydrated protoxide of manganese, and liquid muriate of lime, are produced in mixture. I expose this mixture to atmospherical air, from which the hydrated protoxide absorbs oxygen; and I accelerate this absorption of oxygen by causing the fluid mixture to be projected into the air, in finely divided particles, by communicating a rapid rotary motion to the shafts and paddles before mentioned.

The absorption of oxygen converts the hydrated protoxide of manganese into hydrated peroxide, and the operation, which I have described, may be continued until the conversion of the whole is complete; but, as the progress of the conversion is slow towards the end of the operation, I prefer to conclude when three-fourths or five-sixths of the protoxide present has been so converted; I thus obtain the artificial oxide of manganese, containing sufficient oxygen to make it suitable for the preparation of chlorine gas; and, at this time of the operation, I separate the greatest part of the muriate of lime from the oxide of manganese, by allowing the oxide to subside, and afterwards washing out the muriate of lime with water; but this separation may be in like manner effected previously to the conversion above described.

I collect the mixture of oxide and water on filters, and drain off the greatest part of the water, which leaves the oxide in a state fit to be used with muriatic acid gas, or strong muriatic acid, for the preparation of chlorine; but this oxide still contains a considerable quantity of water, and if I wish to use the oxide with muriatic acid of less than full strength, I previously expose the oxide to heat, for the purpose of drying it in pans, stoves, or furnaces, at such a temperature as will not cause oxygen gas to be driven off from the oxide.

As to that part of my invention which relates to obtain-

ing the artificial oxide of manganese, and the use of such oxide with muriatic acid, I do not confine myself to the use of the apparatus, hereinbefore mentioned, for effecting the objects of this part of my invention, as other apparatus may be employed for such purposes; nor do I claim any privilege with respect to the said apparatus; nor do I claim the preparation of protoxide of manganese from its muriate, by means of lime.

As to that part of my invention which relates to the use of the alkali residuum, which, as I have already stated, contains sulphuret of calcium and carbonate of lime. When this residuum is acted upon by muriatic acid, a mixture of sulphuretted hydrogen gas and carbonic acid gas is evolved.—These mixed gases being placed in contact with another portion of alkali residuum, the carbonic acid re-acts on the sulphuret of calcium, and liberates therefrom a further quantity of sulphuretted hydrogen. Carbonic acid gas being thus absorbed and abstracted from the mixture of gases, sulphuretted hydrogen gas is obtained, nearly free from carbonic acid gas, and in a state favourable to undergo combustion, and thereby produce sulphurous acid.

In order to determine the action of muriatic acid on alkali residuum, I bring them into contact. When I employ muriatic acid, in the state of gas, I prefer to use the condensing apparatus, which I have hereinbefore referred to, as containing siliceous pebbles; and I introduce the alkali residuum, in a finely divided state, mixed with water, into this apparatus, in the manner described in my said former specification, respecting operations with such apparatus, and powdery substances.

The gaseous muriatic acid becomes condensed by its contact with the mixture of alkali residuum and water, and re-acts thereon, evolving sulphuretted hydrogen and

carbonic acid gases, and producing liquid muriate of lime. These products descend through the apparatus, and the liquid muriate of lime flows off through the liquid passage, whilst the gases pass off by the gas passage.

When I employ liquid muriatic acid, to act on alkali residuum, I mix them together in a suitable vessel or apparatus, furnished with a pipe or tube, for conducting off the gases, which are evolved, and I thereby obtain liquid muriate of lime, and a mixture of sulphuretted hydrogen and carbonic acid gases.

The mixed gases, as they pass from the pipe or tube, may at once be caused to undergo combustion, and thus produce sulphurous acid; but I prefer to abstract carbonic acid, from such mixture, by means of another portion of alkali residuum; and I effect this by an apparatus similiar to that which is employed for the purification of coal gas, by what is called "dry lime purification."—

This apparatus consists of vessels containing a number of perforated trays or shelves,—and I place the alkali residuum in thin layers or strata upon these trays or shelves, and then introduce the mixed gases, which percolate through the alkali residuum, and after this percolation through one vessel, are conducted to other vessels, arranged in the same manner.

In purifying coal gas, it is customary to conduct this gas through a series of vessels containing lime, which has been previously used for the same purpose, and which is impregnated in different degrees with the impurities thereby abstracted; and to provide that in passing through the last vessel, the gas shall be in contact with lime, almost or altogether devoid of such impregnation.

In the like manner, I arrange the apparatus containing alkali residuum, so that the mixed gases shall pass through several vessels containing residuum which has been pre-

viously employed for the like purpose, and acted upon in different degrees, and so that the gases, in passing through the last of such vessels, shall percolate through residuum, which is either quite fresh, or but little acted upon by its previous exposure to such gases.—I thus abstract from the mixed gases, the whole or the greater part of the carbonic acid gas, and obtain an increased quantity of sulphuretted hydrogen; and the gas which remains, is rendered more suitable for combustion.

It is proper to observe, that the alkali residuum must contain some water when exposed to the action of the mixed gases, because if it were perfectly dry, the carbonic acid gas would not re-act on the sulphuret of calcium.

Instead of obtaining sulphuretted hydrogen from alkali residuum, by means of muriatic acid, I sometimes use carbonic acid gas, as the agent for effecting reaction on the sulphuret of calcium, and thereby obtaining sulphuretted hydrogen; and for this purpose I employ such an apparatus as I have described, for the application of the mixed gases to the alkali residuum, and I effect the operation in the same manner as I have herein described, for such mixed gases.

The gas obtained from alkali residuum, by the process herein before indicated, may at once be used; but I prefer to collect it in a gasometer before I use it, and when I apply it to the manufacture of sulphuric acid, I transfer it through tubes to a suitable apparatus, wherein I cause it to undergo combustion.—This combustion may be effected by means of burners, similar to those used for burning coal gas; and the operation being conducted in an oven or furnace, connected with a suitable apparatus, the sulphurous acid produced may be converted into sulphuric acid, in the usual manner.

The action of carbonic acid on sulphuret of calcium, con-

tained in alkali residuum, as hereinbefore described, occasions the production of a quantity of carbonate of lime, in addition to that previously contained in the residuum; and I use the carbonate of lime, which I obtain from the residuum, for purposes connected with the manufacture of alkali, instead of native carbonate of lime.

I do not confine myself to the use of the apparatus, hereinbefore described, for effecting the objects of that part of my invention which relates to the use of the alkali residuum, inasmuch as other apparatus may be employed for such purpose; nor do I claim any privileges with respect to the use of such apparatus.

As to the whole, I claim, as my invention, the preparation (for the purpose herein mentioned) of the said artificial oxide of manganese from precipitated protoxide of manganese, by causing this protoxide, whilst in the state of hydrate, to be agitated in contact with atmospherical air, so as to absorb oxygen therefrom; and the use of the oxide, so prepared, for the purpose of producing chlorine, by means of muriatic acid, obtained by the decomposition of common salt; and the use of alkali residuum, for obtaining therefrom sulphuretted hydrogen, by means of muriatic acid, or carbonic acid, or the combined use of these two acids, acting on the alkali residuum; and also the use of alkali residuum, for obtaining therefrom carbonate of lime, to be used in the manufacture of alkali.—[*Inrolled in the Rolls Chapel Office, February*, 1838.]

Specification drawn by the Patentee.

Scientific Notices.

EXPERIMENTS ON THE HULL AND SELBY RAILWAY.

(To the Editor of the London Journal and Repertory of Arts, &c.)

Sir,—I take the liberty of forwarding an account of some interesting experiments with Locomotive Engines on the Hull and Selby Railway.

On Tuesday, the 10th November, a course of five days experiments commenced with the engines of the above Railway, originating through the following circumstances:—

About the commencement of the present year, six engines, somewhat similar to those on the Leeds and Selby line, were in a greater or less state of forwardness for the Hull and Selby Railway, at the works of Messrs. Fenton, Murray, and Jackson, of this town, when the Hull and Selby Railway Company resolved to have six other engines, on the most approved construction which experience up to that period could produce, from the previous working of locomotives on the various railways. Four objects were particularly kept in view, namely, *safety*, *simplicity*, *accessibility* of the various parts, and *economy*, the whole combining general *efficacy* and *durability* of the engine throughout.

The first object is secured by giving a more extended *base* for the action of the springs in supporting the weight of the engine, being about six and a half by eleven feet, whereby a remarkable steady motion is secured at thirty miles per hour. It is not at all a matter of surprise that the four-wheel engines of several railways now in use should every now and then go off the road, and in an instant, when it is recollected the extreme base of their springs for supporting the engine is only about three and three quarters by about six feet; hence their rocking, serpentine, and pitching motion, which without any other cause than a slight

increase of speed, literally lifts the flanges of the wheels above the surface of the rails, and in three or four seconds the engine is turned end for end, upset in the act, and the train with it; whilst the stability of the engine is effectually secured through an extended base upon the front and hind wheels. By means of a new combination, the best properties of the four-wheeled engines are also completely applied, by resting the weight on the crank shaft immediately within the wheels, which experience has for years proved to be the place least likely to injure it, and thereby avoid the alarming accidents which have so often taken place by the breaking of the shaft, through placing the weight on bearings outside of the wheels; the centre of the engine being a sort of neutral axis, there is very little power over its motion in that part, and this advantage, by placing the weight on the crank inside the wheels, is, in consequence, got without a sacrifice of stability.

Secondly,—In addition to the safety and simplicity of having only *two* inner frames, instead of three or four, with as many bearings on the crank shaft, the space under the boiler is still further stripped of machinery by a new valve motion, which gives a high degree of openness and facility of access so desirable in examination, cleaning, &c. of the working parts.

Thirdly,—The steam being used expansively by the valve motion above alluded to, a great saving in fuel is effected, as will be seen on examining the results of the experiments, and as the excessive wear and tear of locomotive boilers arises from intense heat, it is not improbable this decided step towards removing the cause will prevent the effect, namely, the rapid destruction of the boiler. The action of this valve motion is perfectly smooth, being worked by eccentrics (which are also of an approved construction), and any quantity of steam from 25 to 90 per cent. on the stroke can be admitted into the cylinders with the most ready and complete control, at any speed the engine may be going; if a high wind or an incline oppose the progress of the engine, a greater quantity of steam is admitted; if wind or gradients be favourable, the steam is still admitted at full pressure into the cylinders, but shut off at an earlier period, propelling the pistons

the remainder of the stroke by its elastic force, similar to driving a time-piece by the uncoiling of the main spring.

Lastly,—a combination of dimensions and proportions have been gleaned from the best results of locomotive engines of various constructions, and in use in different parts of the country. The driving wheels are 6 feet diameter, length of the stroke 2 feet, diameter of cylinders 12 inches, inside dimensions of fire-box, 2, by 3½ feet, tubes, 94 in number, by nine and a half feet long, and 2 inches diameter. The general diminution of machinery in the construction has given room for ample dimensions in the principal working parts, and thus the whole arrangement has a close bearing on *safety, simplicity, accessibility, and economy.*

Circumstances led to those engines being ordered of Messrs. Shepherd and Todd, Railway Foundry, of this town. The Hull and Selby line was opened with the engines of the former order, but the public and the company being so much annoyed by hot cinders from their chimnies, burning whatever they lighted upon, and rapidly destroying the smoke boxes themselves, three of those engines were altered, and succeeded to a considerable extent in diminishing the nuisance, whilst the engines performed better, and with less fuel. That fact, however, being questioned, and two engines of the *improved* construction having got to work, Mr. John Gray, the engineer of the locomotive department, and patentee of the improved engines, urgently requested a most rigorous and simultaneous trial of the different engines, and to be witnessed for the parties concerned by persons above suspicion. Mr. J. Miller and Mr. T. Lindsley represented Messrs. Fenton, Murray, and Jackson; Mr. J. Craven and Mr. J. Barrons represented Messrs. Shepherd and Todd; and Messrs. E. Fletcher, W. B. Bray, J. G. Lynde, jun., J. Farnell, and J. Gray, were the representatives of the Hull and Selby Railway Company. The arrangements for the experiments were, that the gross load should include engine, tender, carriages, and every thing in the train.

The steam was got up in the respective engines to the pressure of from 56 to 66 lbs. per square inch; the fires filled to a certain level at the starting in the morning, and filled to the same level on finishing the last trip at night. The pressure of steam at starting

was generally up to 66 lbs. and was at about half that pressure at the end of each trip. There were *fifty* experimental trips made in all, namely, twenty-four trips with the *Collingwood, Andrew Marvel*, and *Wellington*, the unaltered engines of Messrs. Fenton, Murray, and Jackson. Their average gross load was 53.4 tons, or 1656 tons, over one mile: consumption of coke 1013 lbs. or 0.611 lbs. per ton per mile; water, 6500 lbs. or 3.90 lbs. per ton per mile. There were ten trips made with the other three engines of Messrs Fenton, Murray, and Jackson, which were altered at Hull, namely, the *Exley, Kingston*, and *Selby*. Their average load was 49.16 tons, or 1524 tons over one mile; consumption of coke, 635 lbs. or 0.416 lbs. per ton per mile; water, 4264 lbs. or 2.79 lbs. per ton per mile.

The *patent* engines made by Messrs. Shepherd and Todd, viz. the *Star* and *Vesta*, made sixteen trips, and their average loads, &c. were 55.4 tons, or 1718 tons over one mile; coke consumed, 465 lbs. or 0.271 lbs. per ton per mile; water, 2874 lbs. or 1.62 lbs. per ton per mile. The average gross load of all the fifty trips is 53.2 tons, or 1649.4 tons over one mile, and taking that as a standard load, the consumption of fuel and water performing exactly equal quantities of work, is represented in the following tables:—

Class of Engine	Load in tons conveyed over one mile.	Elsecar Coke used per trip of 31 miles, in lbs.	Coke used per mile in lbs.	Coke used per ton per mile in lbs.	Water used per trip of 31 miles in lbs.	Water per mile in lbs.	Water per ton per mile, in lbs.
Patent	1649.4	446.98	14.41	0.271	2672	86.19	1.62
Altered	1649.4	686.15	22.13	0.416	4601.8	148.43	2.79
Unaltered	1649.4	1007.78	32.59	0.611	6432.6	207.5	3.90

The financial annual result of the three classes of engines for coke and boilers, with such a traffic as that of the Hull and Selby line, will be about:—

£4500 for the unaltered engines.

£2250 for the altered ditto; and about

£2000 for the patent engines,

In conclusion, it is deserving of remark, that *all* the attesting witnesses expressed themselves highly satisfied with the manner in which the experiments had been conducted, and with the facilities which the Company so readily granted to enable them to come at correct results. Probably no experiments were ever made under similar circumstances where the parties concerned displayed greater independence, impartiality, and good feeling than on the present occasion.

LEEDS.

21st Nov., 1840.

REPORT OF TRANSACTIONS OF THE INSTITUTION OF CIVIL ENGINEERS.

(Continued from page 174, Vol. XVII.)

March 31, 1840.

The PRESIDENT in the Chair.

"On reclaiming Land from the Sea, with Plans illustrative of Works in Loughs Swilly and Foyle."

By J. W. Bazalgette, Grad. Inst. C. E.

The art of reclaiming land from the sea has been practised from a very remote period. Among the instances best known to us are Romney Marsh, in Kent; the Foss Dyke, in Lincolnshire, and the coasts of Holland and Flanders. The extreme fertility consequent on such reclamations has caused many attempts to be made, and nearly all have been successful; but none presents a greater prospect of success than that about to be undertaken under the direction of Mr. Macneil on the borders of Loughs Swilly and Foyle, in the counties of Donegal and Derry.

Lough Foyle communicates with the Irish Channel by a narrow inlet, above which it spreads over a wide tract of land, and then, suddenly contracting, joins the river Foyle about four and a half miles below Londonderry, up to which city it is navigable for vessels of 500 or 600 tons burden. The rush of the tide through

such a small inlet has carried with it great quantities of alluvial soil, which it has gradually deposited on the side of the lough, and thus formed a bank which extends four or five miles in length, and is only covered by the tide at high water. In order to reclaim this tract of valuable land, of about 25,000 acres, it is proposed to construct, somewhat below low water, an embankment or sea wall, of about fourteen miles in length. The tide never rises here above twelve feet, nor is there ever any swell in the lough to endanger the structure.

Lough Swilly is wider at the mouth which opens into the Western Ocean, and is consequently more subject to the effect of wind than Lough Foyle. The highest tides rise about 18 feet. Several embankments are proposed, which will reclaim altogether about 2000 acres of land; a tract already reclaimed, which is considered to be of the best quality in the country, lets at £5. per acre. The measurements and soundings to ascertain the best position and requisite depths of the embankments were thus taken. A tide guage was permanently fixed on which the range of high and low water was marked; a constant register was kept of the soundings, and the time at which they were made; these were afterwards reduced to the high or low water of any one tide. The distances were determined at the same time, by means of a pocket sextant from the boat, angles being taken between certain fixed objects on the shore, so that the exact situation of the soundings could be ascertained and laid down with great accuracy. The slopes of the faces of the embankments vary on the sea face from three or four to one, and two to one on the land side. Each has a culvert 4 feet diameter, with sluices and flood-gates, founded upon piling with tie beams, and the spaces filled with concrete, the whole being covered with planking. The gates are at the lowest level of spring tides, so as to allow of the greatest degree of drainage. The wing walls of squared rubble stone stretching on either side of the gates are founded also on a bed of concrete, 4 feet wide by 2 feet deep. These gates are to be used either to keep back the fresh water for the purpose of irrigation, or for scouring away the silt which would accumulate externally in front of them. A bed of

puddle, 4 feet 6 inches wide at the bottom and 3 feet wide on the top, extends longitudinally throughout the embankments. The land water is carried away by a series of catchwater drains, which extend around the reclaimed lands at the level of high water, having sufficient fall to secure its drainage through the sluices. These drains are puddled, and have their internal faces covered with sods, at an inclination of two to one.

As there are many situations where stone is very scarce, and where timber abounds, the author has turned his attention to devising a plan of embanking applicable to such localities. It may be thus briefly described: The body of the embankment should be of clay, earth, gravel, and stones, dug from the surface and thrown up in a bank, with a slope suited to the force likely to act upon it. On the water side is placed a strong facing of fascines, 6 feet thick at the bottom and 4 feet thick at the top, embedded in the soil in an oblique direction, the dip being towards the land; they are securely fastened down by iron screws running at right angles through the whole height. The land face is covered with sods. In a country where wood abounds, this kind of embankment would be formed at a very cheap rate. In other situations, where the embankments would be subjected to greater strain, the thickness of the mass of fascines should be increased to 13 feet at the bottom and 4 feet at the top. In this case, at 4 feet from the front of the bottom of the slope should be placed a row of fender fascines, 3 feet wide by 2 feet high, bolted down, for the purpose not only of defending the face of the bank from the action of the sea, but for retaining all deposits left behind by it; by which means the embankment would in time acquire a natural face of soil, as is the case with some of the embankments in Holland. The average cost of this kind of embankment, including the sluices and the necessary bed of puddle in the centre, would be about £12. per running yard.

This paper is accompanied by seven plans of the proposed embankments and charts of the loughs.

"On the use of Mica, as a Substitute for Glass, in the Windows of Workshops."

By Joseph Glynn, F. R. S., M. Inst. C. E., &c.

In the windows of the workshops at the Butterly Iron Works, so much glass was broken by the chippings of iron, that a substitute was sought which should resist a moderate blow, and yet be translucent. A quantity of sheets of mica were procured from Calcutta, which, when fixed into the cast-iron window frames, were found to resist the blow of a chipping of iron driven off by the chisel with such force as would have shivered a pane of glass. Mica possesses both toughness and elasticity, and when a piece of iron does penetrate it, merely a hole is made large enough to allow the piece to pass, while the other parts remain uninjured. It is not quite so transparent as glass, but it is not so much less so as to be objectionable; but this circumstance is not important at Butterly, as, in consequence of the quantity of flouric acid gas evolved from the fluate of lime used as a flux in the blast furnaces, the glass in the windows is speedily acted upon, and assumes the appearance of being ground. Mica is a little more expensive than common glass; but, as its duration promises to be much longer, it must be more economical; and if an extensive use of it could be induced, a more ready supply would be obtained—probably from Pensylvania or from Russia, where it is commonly used for windows in farm-houses, and also on board ships of war, as it is less liable to be fractured by the concussion of the air during the discharge of heavy artillery. It can be procured of almost any dimensions necessary for ordinary purposes, as it has been found in Russia in masses of nearly 3 feet diameter. It is susceptible of very minute subdivision, as, according to Haüy, it may be divided into plates no thicker than one three-hundred-thousandth part of an inch.

"On a Specimen of White Cedar from Bathurst, New Brunswick." Sent by Mr. Churchill.

The specimen exhibited to the meeting was of the dimensions calculated for a railway sleeper, for which use it was proposed to introduce this timber, as it is stated to possess, in a very superior degree, the quality of durability in situations calculated to try its properties. It can be imported at about 3s. 9d. to 4s. per sleeper.

Mr. Hawkins observed, that he knew that species of timber well, having seen it extensively employed in the United States. It is an evergreen tree, and grows only in wet or boggy grounds, and is found most plentifully in New Jersey, Maryland, and Virginia. It attains the height of 70 to 80 feet, but is rarely more than 3 feet in diameter. The concentric circles in it are always perfectly distinct, and prove that the tree only arrives at its full growth after a long term of years—as many as 277 annular rings have been counted in a trunk 21 inches diameter, at 5 feet from the ground. The wood is light, soft, fine grained, and easily wrought. It has an aromatic odour, which it preserves as long as it is guarded from humidity. It resists alternations of dryness and moisture better than any other wood; and on this account is extensively used for shingles for roofing. They sell at Baltimore for 4 to 5 dollars per 1000. These shingles will last from 30 to 40 years. It is in great demand for household utensils, so much so that a distinct class of coopers are called cedar coopers. It is used for boat building on account of its great buoyancy. Cedar boards are sold at Philadelphia at 20 dollars per 1000 feet. White cedar rails, with red cedar posts, form the most durable kind of fence, being known to have lasted from 50 to 60 years. The rails are sold at 6 to 8 dollars per 100, and the posts at 12 or 15 cents each.

Mr. Brunel did not think it was a cheap or a strong wood. He had used it chiefly for covering locomotive boilers, as it resisted heat better than any other wood. When he purchased some there was but little in the market, and it was consequently dear.

Mr. Joseph Horne objected to its use for sleepers on account of its tendency to split so easily; but he had found it resist wet perfectly.

April 7, 1840.

The PRESIDENT in the Chair.

"Account of a series of Experiments on Locomotive Engines, more particularly on the 'England,' the 'Columbia,' and the 'Atlantic,' manufactured by Mr. Norris, of Philadelphia."
By Captain Moorsom, R. E., Assoc. Inst. C. E.

The engines of which the author more especially treats were constructed by Mr. Norris, of Philadelphia, and sent by him to England, under an agreement to supply "locomotive engines of a higher power, greater durability, and less weight," than could be obtained in this country. They were to be subjected to fifteen trials within thirty days, and prove their capability of drawing "up a gradient of 1 in 330, a load of 100 tons gross weight at the speed of 20 miles per hour; and up a gradient of 1 in 180, a load of 100 tons gross weight at the speed of 14 miles per hour." The pressure of the steam in the boiler was stipulated by the Grand Junction Company (on whose railway the trials were made) not to exceed 60 lbs. per square inch.

The construction of these engines is very simple, and the work plain. The boiler is horizontal, and contains 78 copper tubes, 2 inches diameter and 8 feet long each, with an iron fire-box. The cylinders, 10½ inches diameter, are slightly inclined downwards, and so placed that the piston rods work outside the wheels, thus avoiding the necessity of cranked axles. The frame is supported by 6 wheels: the two driving wheels, of 4 feet diameter, are placed close before the fire-box; the other four wheels, of 30 inches diameter, are attached to a truck, which carries the front end of the boiler, and is connected with the frame by a centre-pin,

Q 2

on which it turns freely, allowing the truck to accommodate itself to the exterior rail of the curve, and with the assistance of the cone of the wheels to pass round with very little stress upon the rails.

	Tons.	cwts.
The weight of the engine, with the boiler and fire-box full, was	9	$11\frac{1}{4}$
That of the tender, with 21 cwts. of coke and 520 gallons of water, was	6	$4\frac{1}{4}$
Total weight	15	$15\frac{1}{2}$
The engine, when empty, weighed	8 tons.	

The trials were made on the Grand Junction Railway in April and May, 1839, and were continued over the whole distance from Birmingham to Liverpool, except when stopping short at Warrington to take loads; and occasionally making double trips, so as to travel the total distance of 156 miles per day. Attention was more particularly paid to the speed when ascending the gradients, which rise at the rate of 1 in 330 (16 feet in a mile) or 1 in 177 (29 feet 4 inches per mile), and as the engines approached these gradients frequently either at an accelerated or a diminished speed, the observations were made at the points most remote from the cause of variation from uniform velocity. Some of the trials were made with such a number of empty waggons to make up the weight, that the train attained a length of nearly an eighth of a mile; this required some allowance, which was estimated at from one-eighth to one-ninth in addition to the actual weight of the empty waggons.

The extreme limit of working pressure of the steam in the boiler was 62 lbs. per square inch, except for a few minutes on one occasion, when it rose to 64 lbs. The usual pressure for the locomotive engine boilers on railways, now generally at work, is from 50 to 75 lbs. per square inch.

An analysis of the tabulated results of the several trips give these general results :—That on a plane of 1 in 330, with a load varying

from 100 to 120 tons, the speed varied from $13\frac{9}{10}$ miles to $22\frac{1}{2}$ miles per hour: that on a plane of 1 in 177, with a load of 100 tons, the speed varied from $9\frac{8}{10}$ miles to $13\frac{8}{10}$ miles per hour.

From the analysis it appears, that allowing in five of the trials the stipulated amount of performance to have been made, and that in five other trials a doubt may exist, still in the remaining eleven trials the exact amount of duty demanded was *not* performed.

A comparison of the journeys *up* from Liverpool to Birmingham, with those *down* from Birmingham to Liverpool, gives rather a singular result. The aggregate rise of the gradients from Liverpool to Birmingham is about 620 feet, that from Birmingham to Liverpool is about 380 feet (exclusive, in both cases, of the Liverpool and Manchester Railway); the difference, therefore, up to Birmingham is about 240 feet. In 7 journeys of 596 miles *up* to Birmingham, the engine conveyed 682 tons gross, evaporated 12,705 gallons of water, and consumed 177 sacks of coke, ($1\frac{1}{2}$ cwt. each). In 7 journeys of 596 miles *down* from Birmingham, the same engine conveyed 629 tons gross, evaporated 12,379 gallons of water, and consumed 177 sacks of coke. It would thus appear, that the consumption of fuel was the same in both cases, and the only difference was the evaporation of 326 gallons of water more in the journey *up* than in the journey *down*, conveying nearly the same load both ways.

The author remarks, that in the early stage of his observations on the engine, he would have inferred that, from the mode of construction, it was not calculated for high speeds, such as are required for the mail trains; yet that he has often seen it travel, with apparent ease, at the speed of 30 miles per hour; and he thinks that, with some slight modification of the working parts, engines of this construction may be made to do any duty now required from locomotive engines; and, from the small quantity of repair required during the trials, (only renewing the fire-bars, which were originally intended for burning wood, and putting nine stronger ferules in the tubes,) he is of opinion, that the present

construction is exceedingly well calculated for heavy loads—that it may be modified for attaining high speeds—and will prove a durable and economical machine.

[*To be continued.*]

List of Patents

Granted for Scotland subsequent to October 22nd, 1840.

To Thomas Smedley, of Holywell, Flintshire, for certain improvements in the manufacture of tubes, pipes, and cylinders. —Sealed 27th October,

George Hicks, of Manchester, agent, for an improved machine for cleaning or freeing wool, and other fibrous materials, of burs and other substances,—Sealed 27th October.

Miles Berry, of the Office for Patents, 66, Chancery-lane, patent agent, (being a foreign communication,) for certain improvements in the arrangement, construction, and mode of applying certain apparatus for propelling ships and other vessels.—Sealed 29th October.

Edmund Rudge, junior, of Tewkesbury, tanner, for a new method or methods of obtaining power for locomotive and other purposes, and of applying the same.—Sealed 2d November.

Benjamin Hick, junior, of Bolton-le-moors, engineer, for certain improvements in regulators or governors, for regulating or adjusting the speed or rotatory motion of steam-engines, water wheels, and other machinery.—Sealed 3d November.

John Condie, manager of the Blair Iron Works, Ayrshire, for improvements in applying springs to locomotive, railway, and other carriages.

Luke Hebert, of Birmingham, for improvements in the manufacture of cofered spades and shovels, soughing and grafting tools, —being a foreign communication.—Sealed 4th November.

Arthur Wall, of Bermondsey-wall, surgeon, for a new composi-

tion for the prevention of corrosion in metals, and for other purposes.—Sealed 5th November.

James Heywood Whitehead, of the Royal George Mills, in Saddleworth, Yorkshire, manufacturer, for improvements in the manufacture of woollen belts, bands, or driving straps.—Sealed 6th November.

Samuel Wilkes, of Darleston, iron-founder, for improvements in the manufacture of vices.—Sealed 6th November.

Joseph Bennett, of Turnlee, near Glossop, cotton spinner, for certain improvements in machines for cutting rags, ropes, waste hay, straw, or other soft or fibrous substances, usually subject to the operation of cutting or chopping; part of which improvements are applicable to the tearing, pulling to pieces, or opening, of rags, ropes, or other tough materials.—Sealed 9th November.

Charles Bayne, of South Lambeth, for improvements in salting animal matters.—Sealed 11th November.

Henry Hind Edwards, of Nottingham-terrace, New-road, London, (a foreign communication,) for improvements in evaporation. —Sealed 11th November.

Elijah Galloway, of Manchester-street, London, engineer, for improvements in propelling rail-road carriages.—Sealed 11th November.

Nathan Defries, of Paddington-street, London, engineer, for improvements in gas meters.—Sealed 11th November.

Henry Houldsworth, of Manchester, cotton spinner, for an improvement in carriages for the conveyance of passengers on railways, and an improved seat, applicable to such carriages, and to other purposes.—Sealed 11th November.

Joseph Whitworth, of Manchester, engineer, for certain improvements in machinery or apparatus for cleansing and repairing roads or ways, and which machinery is also applicable to other purposes.—Sealed 16th November.

Samuel Wilkes, of Darleston, iron-founder, for improvements in the manufacture of hinges.—Sealed 17th November.

Thomas Horne, of Birmingham, brass-founder, for improvements in the manufacture of hinges.— Sealed 18th November.

James Smith, of Deanstone Iron Works, Perthshire, cotton spinner, for improvements in the preparing, spinning, and weaving of cotton, silk, wool, and other fibrous substances, and in measuring and folding woven fabrics.—Sealed 19th November.

Benjamin Winkles, of Northampton-street, London, steel and copper plate manufacturer, for certain improvements in the arrangement and construction of paddle wheels and water wheels.—Sealed 19th November.

Robert Hawthorn, and William Hawthorn, of Newcastle-upon-Tyne, civil engineers, for certain improvements in locomotive and other steam-engines, in respect of the boiler, and the conveyance of steam therefrom to the cylinder.—Sealed 20th November.

Peter Bradshaw, of Dean, near Kimbolton, for improvements in dibbling and drilling corn, seeds, plants, roots, and manure.—Sealed 20th November.

New Patents

SEALED IN ENGLAND.

1840.

To John Duncan, of Great George-street, Westminster, gentleman, for improvements in machinery for cutting, reaping, or severing grass, grain, corn, or other like growing plants or herbs,—being a communication.—Sealed 2nd November—6 months for inrolment.

Elijah Galloway, of Manchester-street, engineer, for improvements in propelling rail-road carriages.—Sealed 2nd November—6 months for inrolment.

Josiah Pumphrey, of New Town-row, Birmingham, brass-founder, for certain improvements in machinery, to

be employed in the manufacture of wire hooks and eyes.—Sealed 2nd November—6 months for inrolment.

Henry Wimshurst, of Limehouse, ship builder, for improvements in steam vessels, in communicating power to propellers of steam vessels, and shipping and unshipping propellers.—Sealed 2nd November—6 months for inrolment.

James Heywood Whitehead, of Royal George Mills, York, manufacturer, for improvements in the manufacture of woollen belts, bands, or driving straps.—Sealed 2nd November—6 months for inrolment.

James Boydell, junior, of Cheltenham, for improvements in working railway and other carriages, in order to stop them; and also to prevent their running off the rails.—Sealed 2nd November—6 months for inrolment.

John Edward Orange, of Lincoln's Inn Old-square, Captain in the 81st Regiment, for improvements in apparatus for serving ropes and cables with yarn.—Sealed 2nd November—6 months for inrolment.

Herman Schroeder, of Surry Cottage, New Peckham, broker, for improvements in filters,—being a communication.—Sealed 2nd November.—6 months for inrolment.

John Wordsworth Robson, of Wellclose-square, artist, for a certain improvement or improvements in water-closets.—Sealed 2nd November—6 months for inrolment.

Richard Farger Emmerson, of Walworth, gentleman, for improvements in applying a coating to the surfaces of iron pipes and tubes.—Sealed 3rd November—6 months for inrolment.

John Rapson, of Limehouse, millwright, for improvements in paddle wheels for propelling vessels by steam or other power.—Sealed 3rd November—6 months for inrolment.

Henry Hind Edwards, of Nottingham-terrace, New-road,

engineer, for improvements in evaporation.—Sealed 5th November—6 months for inrolment.

Pierre Mathew Mannoury, of Leicester-square, Middlesex, gentleman, for improvements in wind and stringed musical instruments,—being a communication.—Sealed 5th November—6 months for inrolment.

George Gwynne, of Duke-street. Manchester-square, gentleman, for improvements in the manufacture of candles, and in operating on oils and fats.—Sealed 5th November—6 months for inrolment.

George Dacres Paterson, of Truro, Cornwall, Esquire, for improvements in curvilinear turning; that is to say,—a rest adapted for cutting out wooden bowls, and a self-acting slide rest for other kinds of curvilinear turning.—Sealed 5th November—6 months for inrolment.

Charles Joseph Hullmandel, of Great Marlborough-street, lithographic printer, for a new effect of light and shadow, imitating a brush or stump drawing, or both combined, produced on paper; being an impression from a plate or stone, prepared in a particular manner, for that purpose; as also the mode of preparing the said plate or stone, for that object.—Sealed 5th November—4 months for inrolment.

Henry Kirk, of Blackheath, gentleman, for improvements in the application of a substance or composition as a substitute for ice for skating and sliding purposes.—Sealed 5th November—6 months for inrolment.

John Clarke, of Islington, Lancaster, plumber and glazier, for an hydraulic double-action force and lift pump,—being a communication.—Sealed 5th November—6 months for inrolment.

George Delianson Clark, of the Strand, gentleman, for an improved method of purifying tallow fats and oils, for various uses, by purifying them and depriving them of

offensive smell; and by solidifying such as are fluid; and giving additional hardness and solidity to such as are solid; and also by a new process of separating stearine or stearic acid from the elaine, in such substances,—being a communication.—Sealed 5th November—6 months for inrolment.

Alexander Horatio Simpson, of New Palace-yard, Westminster, gentleman, for a machine or apparatus to be used as a moveable observatory or telegraph, and as a moveable platform in erecting, repairing, painting, or cleaning the interior and exterior of buildings; and also as a fire-escape, being a communication.—Sealed 5th November—6 months for inrolment.

Andre Kurtz, of Liverpool, manufacturing chemist, for a certain improvement or certain improvements in the construction of furnaces.—Sealed 5th November—6 months for inrolment.

George Halpin, junior, of Dublin, civil engineer, for improvements in applying air to lamps.—Sealed 7th November—6 months for inrolment.

William Crofts, of New Radford, Nottingham, machine-maker, for certain improvements in machinery for the purpose of making figured or ornamental bobbin net, or twist lace, and other ornamental fabrics, looped or woven.—Sealed 7th November—6 months for inrolment.

Charles de Bergue, of Blackheath, gentleman, for improvements in machinery for making reeds, used in weaving,—being a communication.—Sealed 7th November—6 months for inrolment.

Edward Dodd, of Kentish Town, musical instrument-maker, for improvements in piano-fortes.—Sealed 7th November—6 months for inrolment.

George Edmund Donisthorpe, of Leicester, machine-maker, for certain improvements in machinery or apparatus

for combing and preparing wool and other textile substances.—Sealed 7th November—6 months for inrolment.

Thomas William Parkin and Elisha Wylde, of Portland-street, Liverpool, engineers, for an improved method of making and working locomotive and other steam-engines.—Sealed 10th November—2 months for inrolment.

John Joseph Mechi, of Leadenhall-street, cutler, for improvements in apparatus, to be applied to lamps, in order to carry off heat and the products of combustion.—Sealed 10th November—2 months for inrolment.

Thomas Lawes, of Canal Bridge, Old Kent-road, feather factor, for certain improvements in the method or process, and apparatus for cleansing and dressing feathers.—Sealed 10th November—6 months for inrolment.

William Mc Kinley, of Manchester, engraver, for certain improvements in machinery or apparatus for measuring, folding, plaiting, or lapping goods or fabrics.—Sealed 10th November—6 months for inrolment.

Charles Edwards Amos, of Great Guildford-street, Borough, millwright and engineer, for certain improvements in the manufacture of paper.—Sealed 10th November—6 months for inrolment.

Eugenius Birch, of Cannon-row, Westminster, civil engineer, for improvements applicable to rail-roads, and to the engines and carriages to be worked thereon.—Sealed 12th November—6 months for inrolment.

John Heaton, of Preston, overlooker, for improvements in dressing yarns of linen or cotton, or both, to be woven into various sorts of cloth.—Sealed 12th November—6 months for inrolment.

Otto C. Von Almonde, of Threadneedle-street, merchant, for improvements in the production of mosaic work from wood,—being a communication.—Sealed 12th November—6 months for inrolment.

Charles Dod, of Buckingham-street, Adelphi, gentleman, for certain methods or processes for the manufacture of plate glass; and also of substances in imitation of marbles, stones, agates, and other minerals, of all forms and dimensions, applicable to objects both of use and ornament,—being a communication.—Sealed 12th November—4 months for inrolment.

Charles Wye Williams, of Liverpool, civil engineer, for certain improvements in the construction of furnaces and boilers.—Sealed 17th November—6 months for inrolment.

Joshua Shaw, of Goswell-street-road, artist, for certain improvements in discharging ordnance, muskets, fowling pieces, and other fire-arms.—Sealed 17th November—6 months for inrolment.

Joseph Whitworth, of Manchester, engineer, and John Spear, of the same place, gentleman, for certain improvements in machinery, tools, or apparatus for cutting and shaping metals and other substances.—Sealed 17th November—6 months for inrolment.

James Deacon, of St. John-street-road, gentleman, for improvements in the manufacture of glass chimnies for lamps.—Sealed 19th November—6 months for inrolment.

Alexander Stevens, of Manchester, engineer, for certain improvements in machinery or apparatus to be used as an universal chuck, for turning and boring purposes, which said improvements are also applicable to other useful purposes.—Sealed 19th November—6 months for inrolment.

William Henson, of Allen-street, Lambeth, engineer, for improvements in machinery for making or producing certain fabrics, with threads or yarns, applicable to various useful purposes.—Sealed 19th November—6 months for inrolment.

John Cox, of Ironmonger-lane, civil engineer, for certain improvements in the construction of ovens, applicable to

the manufacture of coke, and other purposes.—Sealed 19th November—2 months for inrolment.

John Wakefield, of Salford, hat manufacturer, and John Ashton, of Manchester, hat manufacturer, for certain improvements in the manufacture of hat bodies.—Sealed 21st November—6 months for inrolment.

William Henry Hutchins, of Whitechapel-road, gentleman, and Joseph Bakewell, of Brixton, civil engineer, for improvements in preventing ships and other vessels from foundering, and also for raising vessels when sunk.—Sealed 21st November—6 months for inrolment.

Francis Pope, of Wolverhampton, engineer, for improvements in detaching locomotive and other carriages.—Sealed 24th November—6 months for inrolment.

John Haughton, of Liverpool, clerk, M.A., for improvements in the means employed for preventing railway accidents, resulting from one train overtaking another.—Sealed 24th November—6 months for inrolment.

Henry Charles Daubny, of Boulogne, Esq., for an improvement in the making and forming of paddle wheels, for the use of vessels, propelled in the water by steam power, and applicable to propel vessels and mills.—Sealed 25th November—6 months for inrolment.

Thomas Barratt, of Somerset, for improvements in the manufacture of paper.—Sealed 25th November—6 months for inrolment.

Junius Smith, of Fen-court, Fenchurch-street, Esq., for certain improvements in furnaces, being a communication. —Sealed 25th November—6 months for inrolment.

Charles Grellett, of Hatton Garden, for new modes of treating potatoes, in order to their being converted into various articles of food; and new apparatus for drying, applicable to that and other purposes,—being a communication.—Sealed 25th November—6 months for inrolment.

William Henry Bailey Webster, of Ipswich, surgeon, for improvements in preparing skins and other animal matters, for the purpose of tanning; and in the manufacture of gelatine.—Sealed 25th November—6 months for inrolment.

Oliver Louis Reynolds, of King-street, Ceeapside, merchant, for certain improvements in machinery for producing stocking fabric, or frame-work knitting,—being a communication.—Sealed 25th November—6 months for inrolment.

Nathaniel Batho, of Manchester, engineer, for certain improvements in machinery, tools, or apparatus, for planeing turning, boring, or cutting metals and other substances.——Sealed 25th November—6 months for inrolment.

Frederic Theodore Philippi, of Bellfield Hall, calico printer, for certain improvements in the art of printing cotton, silk, and other woven fabrics.—Sealed 25th November—6 months for inrolment.

James Lee Hannah, of Brighton, Doctor of Medicine, for an improvement or improvements in fire escapes.—Sealed 25th November—6 months for inrolment.

Robert Roberts, of the Township of Bradford, blacksmith, for a new method or process for case-hardening iron.—Sealed 25th November—6 months for inrolment.

Henry Walker Wood, of Chester-square, gentleman, for an improvement in producing an uneven surface in wood and other substances,—being a communication.—Sealed 25th November—6 months for inrolment.

CELESTIAL PHENOMENA FOR DECEMBER, 1840.

D.	H.	M.	
1			Clock after the sun, 10m. 36s.
—			☽ rises 0h. 24m. A.
—			☽ passes mer. 5h. 36m. A.
—			☽ sets 11h. 2m. A.
	19	5	☿ in Inf. conj. with the ☉.
2	7	18	☽ in □ or first quarter
	9	34	Her: in conj. with the ☽ diff. of dec. 3. 20. S.
	12	19	☿ in Perihelion
5			Clock after the sun, 9m. 0s.
—			☽ rises 1h. 16m. A.
—			☽ passes mer. 9h. 32m. A.
—			☽ sets 4h. 20m. M.
	13	10	♀ in conj. with Vesta diff. of dec. 0. 11. N.
6			Occul μ Arietis im. 8h. 25m.
—			Occul 3 Arietis im. 16h. 35m.
7	23	50	Her: in □ with the ☉
—			Occul 6 Pleiadium im 8h. 13m. em. 8h. 24m.
8	16	15	☿ in conj. with ♃ diff. of dec 2. 5. N.
	20	29	♀ in conj. with Pallas
9	4	17	Ecliptic oppo. or ○ full moon
10			Pallas in Aphelion.
—			Clock after the sun, 6m. 48s.
—			☽ rises 5h. 0m. A.
—			☽ passes mer. 0h. 46m. M.
—			☽ sets 9h. 44m. M.
11	1	1	♀ greatest hel. lat. S.
	12	53	☿ stationary.
12	20	21	☿ greatest hel. Lat. N.
13			Occul A Leonis im. 9h. 31m. em. 9h. 58m.
14			Occul d Leonis, im: 10h. 41m. em. 11. 30.
15			Clock after the sun, 3m. 56s.
—			☽ rises 0h. 9m. M.
—			☽ passes mer. 6h. 11m. M.
—			☽ sets 11h. 59m. M.
	9	4	☽ in □ or last quarter
	11	28	♄ in conj. with the ☉
16	16	6	♂ in conj. with the ☽ diff. of dec. 6 22. N.
	22	9	♂ in Aphelion.
17	21	49	☿ in conj. with the ☽ diff. of dec. 1. 47. N.
—			Occul 75 Virginis im. 17h. 34m. em. 18h. 48m.
18			Mercury R. A. 16h. 14m. dec. 18. 47. S.
—			Venus R. A. 20h. 23m. dec. 21. 25. S.
—			Mars R. A. 12h. 35m. dec. 1. 47. S.
—			Vesta R. A. 19h. 45m. dec. 23. 17. S.
—			Juno R. A. 12h. 6m. dec. 3. 9. S.
—			Pallas R. A. 19h. 47m. dec. 0. 8. N.
—			Ceres R. A. 20h. 59m. dec. 25. 14. S.
—			Jupiter R. A. 16h. 14m. dec. 20. 33. S.
—			Saturn R. A. 17h. 35m. dec. 22. 16. S.
—			Georg. R. A. 23h. 12m. dec. 5. 57. S.
—			Mercury passes mer. 22h. 56m.
—			Venus passes mer. 2h. 34m.
—			Mars passes mer. 18h. 45m.
—			Jupiter passes mer. 22h. 23m.
—			Saturn passes mer. 23h. 43m.
—			Georg. passes mer. 5h. 27m.
19	21	20	Vesta in conj. with Pallas, diff. of dec. 23. 15. S.
20			Clock after the sun, 1m. 57s.
—			☽ rises, 5h. 8m. M.
—			☽ passes mer. 9h. 10m. M.
—			☽ sets 1h. 3m. A.
	20	5	☿ greatest elong. 21. 50. W.
21	5	13	☉ enters Capricornus; Winter commences.
	6	37	♃ in conj. with the ☽ diff. of dec. 5. 37. N
	11	29	☿ in conj. with the ☽ diff. of dec. 6. 53. N.
22	19	19	♄ in conj. with the ☽ diff. of dec. 5. 12. N.
23	9	25	Ecliptic conj. or new moon
25			Clock before the sun, 0m. 33s.
—			☽ rises 9h. 34m. M.
—			☽ passes mer. 1h. 20m. A.
—			☽ sets 5h. 13m. A.
	4	5	Juno in conj. with the ☉
28	10	54	♀ in conj. with Ceres diff. of dec. 6. 5. N.
29	17	36	Her: in conj. with the ☽ diff. of dec. 3. 37. S.
31	10	50	☽ in □ or first quarter.

The Satellites of Jupiter are not visible until the 16th of this Month, Jupiter being too near the Sun; and afterwards no eclipse will be visible at Greenwich.

J. LEWTHWAITE, Rotherhithe.

THE

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CONJOINED SERIES

No. CVIII.

Recent Patents.

To JOHN MELLING, *of Liverpool, in the county of Lancaster, engineer, for his invention of certain improvements in locomotive steam-engines, to be used upon railways, or other roads, part of which improvements are also applicable to stationary steam-engines, and to machinery in general.*—[Sealed 26th July, 1837.]

THESE improvements in locomotive steam-engines, to be used upon railways and other roads, part or parts of which improvements are applicable to stationary steam-engines, and to machinery in general, consist, firstly, in a new mode of coupling those wheels of locomotive engines, which are fixed upon the crank axles, and made to revolve, by the direct power of the engine, with the ordinary running wheels of the carriage, mounted upon independent axles, in order that all the wheels may be made to move simultaneously, and prevent the possibility of any of them slipping upon the rails, to which locomotive engines are now generally

subject, when any portion of the rails are wet or greasy, and in snowy or frosty weather; which slipping causes the engine to perform a much longer journey than the actual length of the line of railway, and consequently, to consume a greater quantity of fuel than is necessary, as well as very materially injuring the surfaces of the rails, and causing very irregular wear upon the periphery, or tire of the engine carriage wheels. It is well known that the carriage wheels of locomotive engines have previously been coupled together, in order to obviate this defect; but it has been done with a very inconvenient arrangement of outside cranks and connecting rods; and as to this method, many practical objections belong, which although not of sufficient importance to prevent its adaptation to engines used to transmit heavy loads, have nevertheless much limited its application to those constructed to run at greater velocities.

My improved method of coupling the engine wheels, is effected by the application of a pair of friction wheels or rollers, of any suitable diameter, placed between the peripheries of the driving wheels and the running wheels of the locomotive carriage. This assistance is however only required in those instances where the weight upon all the wheels is not uniform or sufficient to prevent some of them slipping upon the rails;—the quantity or degree of fiction being readily accommodated to circumstances, and the connection or coupling between any two wheels, whatever their respective diameters, may be produced or removed at pleasure.

This contrivance is very advantageous in comparison with the old mode of coupling, as, if the rails are dry and the adhesion is sufficient, the coupling or friction wheels may be lifted off and remain idle; but in the present system of coupling by cranks and connecting rods, they must always continue working, and thus, at certain times, only act as an incumbrance.

Another important feature in this improved mode of coupling the wheels, is the smoothness with which the engine works when the cranks are passing their centres, instead of being subjected to the sudden blows and jerks which occur to engines coupled in the ordinary manner. This improvement is effected by transmitting a considerable portion of the weight from the cranked or driving axle to the straight or independent axle, and entirely prevents the tremulous lateral motion of ordinary locomotive engines; and when passing over inequalities in the surface of the road, tending greatly to prevent the destruction of the engine springs, and the beating of the rails, usually attendant upon such occurrences.

Secondly, my improvements consist in the application of an apparatus to the running wheels of locomotive engines, tenders, or passenger or luggage carriages, to act as a "drag" or retarder to the revolution of the wheels, for the purpose of causing the carriage to stop immediately, in case of accident, or under any other circumstance, requiring the use of a brake. The ordinary mode of applying the brake to the running wheels, is by expanding two pointed pieces of timber by means of a wedge and screw, and thereby bringing their surfaces in contact with the peripheries of the running wheels, in order to produce sufficient friction to impede their progress. Such modes are not only expensive, owing to the rapid wear of the wood, but in wet weather have been found to be exceedingly unsafe, as sufficient friction is not to be obtained to hold the wheels.

My third improvement consists in a combination of apparatus for working the slide valves of locomotive steam-engines; by which apparatus I am enabled entirely to dispense with the imperfect mode of working them by excentrics, as hitherto practised; and this part of my improvements is equally applicable to marine and stationary steam

engines, and will be found to render them much more perfect and effective in their operation. The most important feature of this part of my invention, is the great reduction of friction effected by it, and, consequently, considerable addition of power, as the bearing upon the circumference of the excentrics is reduced to that of a mere stud or pin.

A further improvement, arising from this mode of working the slide valves, is, that they are driven from the ordinary connecting rod instead of being worked by excentrics, mounted on the crank shaft, as heretofore; in which case, if by any accident the crank shaft happened to have become bent or broken, it could not effect the opening and closing of the side valves.

My fourth improvement consists, in a new mode of economizing fuel in locomotive steam-engines, by placing under the grate or fire-bars, a shallow tank or vessel, instead of the ordinary thin plate which is usually suspended below the furnace, for the purpose of receiving the falling cinders. This tank is to contain a depth of water of three inches or thereabouts, and by means of a stop-cock, is to be filled with water from the tender. The falling cinders and waste heat from the furnace, by these means, will be enabled to heat the water in the tank, and by returning into the tender, will raise the temperature of the water therein; hence, the boiler will be always supplied with hot water, and consequently effect a great saving in fuel.

To render this part of my improvements self acting, the boiler is furnished with a ball valve, weighted to fifty pounds pressure on the square inch,—so that at such pressure the steam will escape and pass into the water tank, and become condensed. By this arrangement the boiler may be always supplied with water, at or near the boiling point, instead of pumping cold water from the tender, as heretofore.

My fifth improvement consists in the application of small jet pipes to locomotive engines, for the purpose of cleansing the rails from snow, grease, or sand, while the engine is travelling thereon, at whatever speed it may be running;—these small jet pipes hang immediately over the centres of each rail, and through these pipes, by means of a swivel cock, which is connected with the boiler, either steam or steam and hot water, as shall be found necessary, may be blown, and thus make the rails perfectly clean and dry, which, (in snowy or frosty weather, or at the *station* ends of the rails, where they are always greasy,) combined with my improved mode of coupling, will be found to prevent the slipping of the engine wheels entirely; or, if it is more convenient, hot air and cold water may be blown upon the rails with a similar effect.

And my sixth improvement consists in an arrangement of apparatus for drawing locomotive engines, which is simply a modification of my method of coupling the engine carriage wheels; that is, by mounting my improved coupling or friction wheels upon the main cranked or driving shaft, and placing them between two pairs of running wheels; the coupling or friction wheels being made of sufficient diameter to bear upon the peripheries of the fore and hind running wheels, and observing to keep their own peripheries two or more inches clear of the rails. This arrangement will be of great service to luggage or heavy engines, as the adhesion, of the whole weight of the engine, is thus at once obtained upon the rails, through the four smaller wheels, and at the same time the cone or outward form of the tires of the wheels cannot vary, which will allow the engine to travel much smoother upon the rails, and with greater economy in all respects.

In order that these my improvements may be better understood, I have attached to these presents three sheets

of drawings, and marked the same with figures and letters of reference. In these drawings I have merely represented an outline of an ordinary locomotive engine, having shewn my different improvements in separate figures, instead of exhibiting them all upon one engine; and that they may be more easily perceived, the new parts are shaded, leaving the ordinary parts in outline, to shew their respective application.

Plate XIV., fig 1, represents a side elevation of a locomotive steam-engine, with its tender attached; fig. 2, is a plan or horizontal view of the engine; and fig. 3, is an end elevation of the same. It will be seen in these figures that I have only represented in outline such general parts of the engine as are requisite to illustrate the application of my improvements, as the ordinary details of the engine would not assist their explanation; these minor parts, therefore, have been purposely omitted. In these figures, the first, second, fourth, and fifth features of my improvements are exhibited, and similar letters of reference point out corresponding parts. *a, a*, represents my improved coupling wheel, and its proper position for connecting the driving wheels, upon the crank shaft, with the running wheels upon the fore axle of the engine. I place one of the coupling wheels or rollers on each side of the engine, and bearing upon the periphery of the driving and running wheels, (as shewn in fig. 2,) without being confined to any dimensions that I may find most practically convenient, and without in any way being affected by the respective diameters of the driving or running wheels of the engine; these coupling wheels *a, a*, are suspended in wrought-iron levers *b, b, b, b*, their fulcrum being at one end at *c, c*; and the other end of the levers are attached to the piston rods *d, d*; these piston rods work in the small steam cylinders *e, e*, which have a common steam-cock, to admit the steam into

them from the boiler.—Now it will be seen that when it is necessary to couple the engine wheels, in order to obtain more adhesion upon the rails, to prevent the slipping of the engine, the cock may be opened, and by letting steam into the top of the cylinders *e, e,* the descent of the piston rod will depress the lever, and bring the coupling wheel *a, a,* into contact with the peripheries of the wheel, and force down the coupling wheel with any degree of pressure that may be required,—in which position it will be firmly held, (that is, bearing upon the peripheries or tires of the driving and running wheels of the engine,) as long as the steam is allowed to remain in the cylinder. When the coupling wheel is no longer required to act upon the engine carriage wheels, it may be dispensed with, and allowed to remain idle, by turning the steam in at the bottom of the small cylinders *e, e,* and thereby raising the piston rods *d, d,* and the levers *b, b,* and consequently lifting the coupling wheels from off the tires of the driving and running wheels.

It will be seen that these coupling wheels *a, a,* are formed with a groove in their peripheries, in which groove the flanches upon the tires of the carriage wheels run, which serve to keep them effectually in gear, and at the same time prevent the distance between the wheels ever becoming too narrow for the width of the rails, in the event of the wheels loosening upon their axles, which occurrence has frequently thrown the engine off the line of railway.—Thus it will be seen, that the wheels of the engine may be coupled and uncoupled at any rate of speed they may be running, and without the slightest difficulty or interruption, and not in any way being restricted to dimensions, either in the driving, running, or coupling wheels. It will also be evident, that this coupling wheel is not confined in its application to locomotive engines, as it may be applied as a medium for driving all kinds of machinery, in order to

dispense with any jerking or unevenness of motion occasioned by toothed gearing, or in order to obviate the difficulty frequently arising from the teeth or cogs of spur wheels breaking.

The second feature of my improvements being the brake or drag, is also shewn in these figures. *f*, *f*, are two small rollers suspended from the levers *b*, *b*, by the frame *g*, *g*, (when applied to the engine,) their own peripheries being in contact, but hanging in the guides *h*, *h*, (as shewn in fig. 1,) entirely free from the peripheries of the engine carriage wheels; and when it is necessary to stop the engine, it may be done with greater rapidity and ease, by letting the steam into the bottom of the cylinder *e*, and thus raising the lever *b*, (at the same time releasing the coupling wheel *a*,) and bringing the peripheries of the two rollers *f*, *f*, into close contact with the tires of the engine carriage wheels, and thus effectually to lock them or impede their progress, by immediately reversing the direction of their revolution.

The same system of apparatus is also shewn, as applied to the tender, but with a different mode of putting the same into operation, as the rollers are there drawn into contact with the peripheries of the carriage wheels, by being raised by the vertical screwed rod *i*, *i*, and suspending links *j*, *j*. This construction of brake or drag will be found the most suitable for tenders and carriages used for the transit of passengers and merchandize.

It will be obvious, that I need not confine myself to the diameters of these rollers, neither to the materials of which they or my coupling wheels may be made; but I prefer they should be constructed of wrought-iron, and running in steel bushes, all being well hardened.

My fourth and fifth features of improvement will also be seen in these figures:—*k*, *k*, *k*, is the shallow tank or water

ash-box, which is suspended beneath the grate bars or furnace of the engine, the interior of which communicates by means of the hose pipe *l, l,* with the tender; and by the pipe *m,* it also communicates with the pumps that supply the boiler. Now it will be seen that the falling cinders from the furnace, as they are caught by this water ash-box, will heat the water therein:—this heating process is also materially assisted by the steam, which, at fifty pounds pressure in the boiler, will raise the ball valves contained in the valve box *n,* and immediately escape through the pipe *o, o,* into the tank *k, k,* and there being condensed, will be found to effect a great saving of fuel, as it is evident that the boiler may always be supplied with hot water.—*p, p,* are the two vertical jet pipes, through which, steam or hot water, or both, may be blown upon the rails by the pipes and swivel-cock *q, q,* from the boiler, and by this means, as occasion may require, the rails may be swept entirely clean and dry, from grease, frost, snow, or other impediment, and at any rate the engine may be running.

The third feature of my improvement, is exhibited in fig. 4, which represents a partial sectional elevation of a locomotive steam-engine; and fig. 5, a plan or horizontal view of the same. In this figure, the boiler is removed, that the new motion for working the side valves, may be exposed. *a, a,* is the main cranked or driving shaft of the engine; *b, b,* the ordinary connecting rods; *c, c,* are studs fixed upon the connecting rods, and carrying small rollers *d, d*;—these rollers work in the morticed links or levers *e, e,* and as the connecting rods vibrate by the rotation of the crank shaft *a, a,* a rotary motion is also communicated to the morticed levers *e, e.* These levers being mounted upon the ends of the smaller cranked shaft *f, f,* cause that shaft to revolve, and consequently vibrate the four small connecting rods *g, g, g, g,* which are of the same throw as the

traverse of the valves. Now as these rods *g, g, g, g,* receive an alternative reciprocating motion at every revolution of the crank shaft, the forked ends *g**, of the rods, vibrate the short levers *h, h,* upon the shaft *i, i,* which being their fulcrum, cause the most effectual opening and shutting of the slide valves, by means of the connecting links *j, j,* which are attached to the valve rods *k, k.* In order to reverse the engine, the attendant engineer has merely to move the lever *l,* which by means of the horizontal rod *m,* and the bell crank lever *n,* will cause the pieces *o, o,* to move vertically in their guide *p*; and as the rollers *q,* at the tail of the pieces *o, o,* run in the curved mortices, formed in the ends of the small connecting rods *g, g, g, g,* the pieces *o, o,* will draw two of the connecting rods *g, g,* out of gear, (that is, release their forked ends from acting upon the rollers upon the levers *h, h,*) and at the same time, put the two other connecting rods, (which work at different angles,) in gear with the levers *h, h,* and consequently change the motion of the slide valves, and cause the steam to enter the cylinder the reverse way. The extremities of the connecting rods *g, g, g, g,* are made with forked ends, in order to assist the rollers upon the levers *h, h,* falling in and out of gear.

By an inspection of the drawing, this improvement, in working slide valves of locomotive engines, will be readily understood, and it will further be obvious, that it can also be applied with equal facility to stationary aud marine steam-engines, and with the same beneficial results. It may be necessary to add, that I prefer the whole of the working parts of this valve gearing to be made of the best wrought-iron, and well case-hardened and polished, which will tend to assist the accuracy of its motion.

Figs. 6, and 7, represent a linear diagram of my sixth improvement, in which *a, a,* is the main cranked or driving

shaft, and placed in the centre of the engine: upon the ends of this shaft, the two large driving wheels *b, b,* are fixed, and these wheels are just clear from running upon the rails, but are bearing forcibly upon the fore and hind wheels *c, c, c, c,* thus transmitting the power of the engine through them, and obtaining the most perfect adhesion upon the rails at all points. This will be found to be simply a modification of my coupling wheel, firstly above described, but at the same time is an improved arrangement of the engine, and will be found most practical and beneficial in those engines which are to be employed to convey heavy trains of merchandize and luggage.

I have represented at figs. 8, and 9, two sectional views of the tire of a locomotive engine wheel, in order to shew the decrease of wear upon the tire of the wheel, (as proved by experience,) in using my coupling wheel to prevent the slipping of the engine. Fig. 8, represents the amount of wear upon the true cone of the tire of wheels of engines that have run without being coupled; and fig. 9, is a representation of a wheel which has performed the same number of journies as the other, but having been coupled by my improved means; and in this figure no wear can be perceived, the true cone of the tire being still perfect.

Having now described each particular in my improvements, I wish it to be understood, that I do not confine myself to the dimensions of any of the new parts, nor to their precise situations,—but I do claim as my invention, the whole of the improvements in locomotive steam-engines, and, as far as the same may be applied, to marine and stationary engines, and to other machinery.—[*Inrolled in the Rolls Chapel Office, January,* 1838.]

Specification drawn by Messrs. Newton and Berry.

To The Right Honorable Peter Robert Drummond, Lord Willoughby de Eresby, *for his invention of improvements in compressing peat.*—[Sealed 20th July, 1839.]

The first part of my invention relates to a mode of using two drawers, frames, or vessels, into which the peat, to be pressed, is put; such drawers being so connected, that the act of moving one from under the press, shall place the other under the press at the same time;—each drawer, frame, or vessel, is capable of independent movement on its axes, in order to discharge its contents after pressure, and to be turned back to receive a fresh supply, as will be hereafter fully described.

Secondly, the invention relates to a mode of employing wood as a means of allowing the passage of water upwards from the peat, when under compression; and in order to give the best information in my power, I will proceed to describe the drawing in Plate XV. I would, however, first remark, that such is the nature of peat, that in submitting it to pressure, in order to express the water therefrom, that unless great care is observed in the constructing of the apparatus employed, the peat as well as the water will be expressed through even very small openings; and it may be useful to state, that the description of peat which should, by preference, be selected, when it is to be submitted to pressure, is that description which is free from fibres, and black, having somewhat the appearance of blackened butter. The peat should be dug as usual, about eight inches by three, and three inches thick; and these blocks of peat are to be placed to dry, for four or five days, and, by preference, under sheds; and again, after pressure, they should be further dried.

In Plate XV., at fig. 1, *a*, is the steam-engine boiler; *b*, steam-engine; *c*, main shaft of engine; *d*, compressing pump; *e*, exhausting pump; *f*, hand-gear, for reversing the motion of the sliding drawers, which contain the peat; *g*, air vessel; and *h*, two cocks, that open and shut alternately, the use of which will be explained hereafter; *i*, and *i*, are pipes attaching the pumps *d*, and *e*, with the vessel *j*, from which four branch pipes *k*, *k*, *k*, *k*, convey the water to the four hydraulic cylinders *l*, *l*, *l*, *l*; and by the pump *d*, the rams or pistons will be forced out, and the compressing plate, to which they are all secured, lowered upon the top of the peat with great power. The peat is to be placed in sliding drawers or frames *m*, of which there are two to the machine, one of them being under compression, while the other is being filled. This frame *m*, contains about one hundred square pieces of peat, as represented in the drawing; but this size may be varied.

The parallel frame *o*, *o*, upon which the frame *m*, has been run out, having been withdrawn, and left the frame or drawer supported by its axes or necks at the ends only,—it is now to be turned over upon these axes or necks, and the compressed peats will be emptied into a railway carriage below to receive them. The sliding frame or drawer *m*, is to be turned back, and the handle *n*, to be pushed in, as represented at the other end of the machine; this having been done, the small rollers, which move on their axes, and are carried by the frame *o*, *o*, will be below, and support the frame or drawer; it may then be refilled, with as much expedition as possible.

I shall now proceed to describe the mode of raising the pistons and compressing plate, which have been forced down by the introduction of water into the hydraulic

cylinders *l, l, l, l*, by the pump *d*. The cocks *h*, are to be reversed, and the exhausting pump *e*, will withdraw the water from the cylinders *l, l, l, l*, and return it to the supply well, as represented in the drawing. This will offer a vacuum to the pistons or rams of the hydraulic cylinder; at the same time, the pump *d*, will continue storing up its power into an air vessel *g*, by pumping back the withdrawn water, and be ready for a second operation. If we suppose the four pistons in the cylinders *l, l, l, l*, are each ten inches in diameter, and the water thus withdrawn, and the atmosphere at liberty to act upon the under-surface of the compressing plate to which the pistons are attached, there would be sufficient power to raise the whole mass, were it not for the adhesion which takes place between the under-side of the compressing plate, and the upper surface of the peat; a very considerable power being requisite to separate them. To effect this object, the compressing plate has eight regulating screws, which, when down, come in contact with eight steel bars, four on each side of the machine, marked *p, p, p, p*, in the elevation, fig. 2. The elasticity of these bars is to overcome the adhesion; and the exhausting pump *e*, will return the pistons and compressing plate to their original position, on the admission of air through a valve in the compressing plate. The handle *f*, of the hand-gear is now to be reversed, which will bring out the sliding frame containing the peats, which are shewn under compression; and the other sliding frame *m*, already described, being refilled, will pass under the compressing plate. This having been done, the cocks *h*, will be returned, and the highly compressed air in the air vessel *g*, will force the water that has been pumped into it by the pump *d*, to the cylinders *l, l, l, l*, and thus exert not only force enough to compress the peat, but to bend the springs

or steel bars, that they, in their re-action, when the machine is reversed, may overcome the adhesion between the compressing plate and the peat.

The second sliding frame *m*, being now out, the handle *n*, is to be withdrawn,—the frame will then swing upon its centres; and the railway carriage being in the position to receive the compressed peats, the sliding frame will be emptied as before. Fig. 3, is a plan of the sliding frames or drawers, shewing the manner of connecting them together by a centre-piece *q*, which admits of the one frame or drawer being turned over, while the other is at rest, and thereby offering great facility to the operation of compressing the peat. Figs. 4, 5, and 6, show the parts on a larger scale; but, in this case, the compressing plate is only worked by two hydraulic cylinders in place of four, as is the case in the other figures; but whatever be the number, the same system of construction of the parts is to be observed. The drawers or frames, which receive the peat, are of a quadrangular form, and of iron, and they slide easily, yet fit closely at the sides in the frame of the hydraulic machine; and the end of the hydraulic press is perforated with fine or very small holes, the bottom of the drawers or frames being closed with a layer of horse-hair cloth, and there is a layer of close linen or cotton fabric between the hair cloth and the peat in the frames; by this arrangement the peat will be prevented filtering away with the water, which is pressed out therefrom in a downward direction; and in order to prevent the peat passing upwards through the pressing plate, and yet have the advantage of allowing the water to run off in an upward direction, the pressing plate has a series of holes, as is very clearly shewn in the enlarged sectional views figs. 4, and 5, and the under plan view fig. 6; and these holes are filled up with wood,—by preference, with beach wood,

with the grain vertical. By this arrangement, the water can pass up through the wood, and run off in grooves formed between the different plates or surfaces which compose the pressing plate; and the water is run off beyond the frames by projecting gutters, as is shewn in the drawing. The pressing plate consists of two surfaces of iron, and one of wood, which are bound to each other; and there is a valve which allows air to pass between the under-side of the pressing plate and the peat, at the time the pressing plate is being raised; the valve being closed when the peat is under pressure.

Having thus described the nature of my invention, and the manner of performing the same, I would have it understood, that I lay no claim to any of the parts herein described, other than is hereafter particularly pointed out, neither do I confine myself to the means shewn and described, of obtaining the requisite pressure, so long as my invention be retained; and what I claim is, first, the mode of combining two frames, drawers, or vessels, as above described. Secondly, I claim the mode of applying wood to the pressing plate, as above described.—[*Inrolled in the Inrolment Office, January,* 1840.]

To William Davis, *of Leeds, machine maker, and* George Kinder, *of Aldmonsbury, cloth dresser, for certain improvements in machinery for dressing and cleansing woollen cloths.*—[Sealed 7th May, 1839.]

These improvements in machinery for dressing and cleansing woollen cloths, consist in a peculiar arrangement of the parts constituting a machine, suited to that object.

The forms and modes of adapting such parts, or me-

chanical agents, will be fully understood by reference to Plate XVI., in which fig. 1, is an end elevation of the machine; fig. 2, an elevation of the reverse end; and fig. 3, a horizontal view of the machine, as seen from above; the middle of the machine being broken away for the purpose of exhibiting some of the parts below. And here it may be observed, that no definite length of the machine is given, because that must depend on the breadth of the cloth intended to be operated upon by the machinery. The respective letters of reference in the drawing, point out the same parts of the machine in all the figures.

The machinery is mounted up a rectangular cast-iron frame, the form of the ends of which, are shewn in figs. 1, and 2; and these are firmly braced together by longitudinal and diagonal bars or rails. A, A, are two flat boards, placed horizontally, the upper faces of which, have a series of pointed wire brushes fixed upon them. These wires must be set in very small knots, and not hooked at their points. When we employ wires of $\frac{1}{60}$th of an inch diameter, we find it desirable that they should not stand less than an inch and half out of the wood. The boards are made to perform reciprocating movements, in lateral directions, by the action of a vibrating lever B, B, to which they are attached, by means hereafter described; D, D, are two horizontal bearers or rollers, intended to receive the cloth under operation, which cloth is to be drawn from one of these rollers D, over the breast beams C, C, fixed in horizontal positions at the back and front of the top part of the framing, and conducted to the other roller D, as shewn by dots in figs. 1, and 2. And E, E, are two other rollers or shafts, having ribs, intended to act as beaters, for removing or beating off the loose wool from the surface of the cloth, after the brushes have acted upon it.

The machinery is put in action by a strap leading from

the rotary part of a steam-engine, or other first mover, applied to the rigger F, on the main driving shaft G, G; or it may be driven by manual or other power, communicated to the shaft G. Upon this shaft there is also a wheel H, affixed, from whence endless straps are conducted to pullies, attached to the axles of the beaters E, E, as shewn in fig. 1. At the reverse end of the main shaft G, a pinion I, is affixed, taking into a wheel K, turning loosely on the axle of one of the rollers D; and also into an intermediate coupling wheel L, which takes into a similar wheel M, turning loosely on the axle of the other roller D; hence, by the rotation of the main shaft, both wheels D, D, are made to revolve, simultaneously, in opposite directions, for the purpose, (when either of them are locked to its shaft,) of drawing the cloth from one roller and winding it on to the other roller, as it passes over the brushes and beaters above.

In order to lock the wheel K, or M, to its shaft, the clutch apparatus N, N, is applied; which apparatus is so well known to mechanics, that no further description is necessary, except to observe, that when the machine is in action, the wheel must be locked to the shaft of that roller which is intended to draw and wind on the cloth, and the other roller allowed to turn freely by the draft of the cloth as it unwinds; but, in order to keep the cloth in tension, a break O, is made to bear upon friction pullies, affixed to each of the rollers D, D.

Upon the main shaft there is a bevel wheel P, taking into a bevel pinion Q, upon a crank shaft R. To this crank a connecting rod S, is attached, the reverse end of which rod works on a stud, fitted to the under part of one of the boards A.

The vibratory levers B, B, carrying the boards A, A, as described above, turn upon vertical axles T, T; and hence, by the rotation of the crank R, the boards A, A, are made

to perform their reciprocating movements, and to brush the under surface of the cloth as it passes over them.

This arrangement is particularly designed for dressing and cleansing cloths, in the raw thread state, after scouring, which considerably reduces the labour in the process of burling. But we sometimes employ the same machine for raising the pile on the face of cloth, previously to shearing it. In that case, instead of the pointed wire brushes, we attach to the boards A, A, teasels, or wire cards, or any other things capable of effecting the same purpose. And we sometimes place bristles or wires round the periphery of the cylinders F, F, between the ribs or beaters.—[*Inrolled in the Rolls Chapel Office, November*, 1839.]

Specification drawn by Messrs. Newton and Berry.

To JOHN PACE, *of Bury St. Edmonds, in the county of Suffolk, watch and clock-maker, (being one of the people called Quakers,) for certain improvements in, or additions to, horological machines.*—[Sealed 14th November, 1833.]

THE invention before us consists of a portable time-piece, constructed in such manner that, besides shewing the time in the usual way, the entire surface of the dial can be illuminated, so as to shew the time by night. An ornamental, metal, or other case or frame, encloses all the works, and every apparatus connected therewith.

The movement is a watch train, with any of the usual balance escapements, and is fixed or attached to the lower part of the case or frame, as shewn in Plate XV., at *a, a*, or to such other parts of the said case, as are hereafter mentioned, so as to be screened and protected from the heat arising from the lamp. The movement is connected with the motion work of the hands, by an endless cord or chain *b*, which passes over two pullies *c, d*; one of them *c*, attached to

the arbor of the centre pinion of the train; the other *d*, to the pinion, commonly known as the cannon pinion, which acts opon the motion work of the hands.

The motion work of the hands is supported by a metal or other plate or bar *e*, which is to be fastened perpendicularly upon, or into, the case or frame. The motion wheels are planted upon, or supported by a cock or raised bar *f*, screwed or affixed to the said plate. The motion is carried forward to the hands by making the arbor of the said cannon pinion, and the socket of the hour wheel, connected therewith, of such length as to allow sufficient space for the light of the lamp to act upon the dial.

The dial is either of metal, glass, silk, paper, parchment, or other suitable material; or it may be composed of a combination of any of the above-mentioned materials, so as to be transparent, or semi-transparent. The figures, or characters, or divisions upon the dial, shewing the hours and minutes, are either printed or formed of metal, and are fixed to the transparent part of the dial.

An opening in the frame or case admits of a fountain lamp *g*, with a floating or other burner *h*; which burner is situated in the unoccupied space left between the motion wheel of the hands and the inner surface of the dial, and so placed as to avoid injuriously heating any part of the said motion wheels, or other works connected therewith. The air, which supplies the place of the oil consumed, is admitted by the tube which supports the burner. The light from the burner is thrown and diffused over the whole surface of the dial by reflectors, properly placed.

To avoid the accumulation of heat, within the case, from the flame of the lamp, an opening is provided at the upper part of the case; which opening can be closed, when the lamp is not burning, by an ornamental cover or slide.—[*Inrolled in the Inrolment Office*, *May*, 1834.]

To JOHN COOPER DOUGLAS, *of Great Ormond-street, in the county of Middlesex, Esquire, for certain improvements in the construction of furnaces for generating heat; and also in the construction of apparatus or vessels for applying heat to various useful purposes.*— [Sealed 19th November, 1833.]

THESE improvements, in the construction of furnaces, consist, firstly,—in causing the gases, smoke, and vapours, produced by combustion of any fuel, to pass upwards through the fire-bars, or other support, of a second fire.

The gases, &c., from the fire under a boiler, pass over a bridge, from whence they descend, under another bridge, into the space beneath another set of fire-bars; thence they ascend, and the smoke, passing through the fuel in combustion, is deprived of its carbon, whilst the permanently elastic gases proceed upwards or forwards to the flue or chimney.

Secondly,—The improvements in the construction of apparatus or vessels for applying heat to various useful purposes, are shewn in figs. 8 and 9, Plate XV.

A vat or other suitable vessel, for carrying on either the vinous or acetous fermentation, is shewn at *f*, fig. 8, and in it is placed the liquid, from which it is intended to make vinegar. When heat is applied to this vat, either by steam being blown into or through the chamber *g*, or by any other arrangement, the vapours raised pass off from the chamber *f*, by a pipe *a*, and enter the worm *h*, in the vessel, where they are cooled and condensed;—a suitable vessel being attached to this worm to collect the condensed vapours.

Fig. 9, represents a close double vessel *k*, *l*, similar to *f*, *g*, in fig. 8. The vapours in this case, after passing

through the tube *m*, are collected in a close vessel or vessels at *n*. To the upper part of this close vessel is applied another vessel *r*, filled with cold water, and containing an improved condenser, which will be seen to consist of numerous vertical hollow cylinders *p*, *p*, arranged close together, and fastened to the bottom of the vessel. The conducting powers of such hollow cylinders (especially when made of metal) are of service in transferring the heat in *n*, to the water in *r*, and thus the vapours in *n*, are cooled down to a liquid state.

These tubes are also applied for transferring heat for the purposes of either cooling or heating, and for boilers or condensers. The patentee sometimes uses hollow prisms instead of tubes, and irregular hollow figures, as well as regular hollow figures. When a flue or worm passes through liquor, it may be found desirable to form the additional conductors as plates, instead of the tubes or hollow figures just mentioned.

The patentee claims the furnace herein described; also the application of heat to a close vessel or vessels, or to the liquid contained therein, in such manner that the vapours may be collected and saved. And further,—the use of vertical tubes, or prisms, or plates, in clusters, attached to the bottoms of boilers or vessels, containing any kind of liquid, or attached to the flues or tubes which carry any heated air, vapour, or flame, through liquids.

The patentee does not limit his claim to the form of construction of the furnaces, apparatus, and vessels herein described.—[*Inrolled in the Rolls Chapel Office, May*, 1834.]

To John Cooper Douglas, *of Great Ormond-street, in the county of Middlesex, Esq., for certain improvements for depriving vegetable juices, and fermented and distilled liquids, of their acid qualities; also of their colouring matter and essential oils.*—[Sealed 21st November, 1833.]

This invention consists, first,—in absorbing the acids and essential oils, of such juices and liquors, as aforesaid, by filtering them through vegetable charcoal, prepared as hereinafter explained; secondly, in afterwards depriving of colouring matter, such juices and liquors as aforesaid, by submitting them to the joint action of animal charcoal and sulphuric acid; and lastly, in afterwards submitting the said juices and liquors to the action of gypsum, by filtering them through a filter containing that material.

Before proceeding to describe the three various processes, which constitute the said improvements, it will be necessary to describe the manner in which the vegetable charcoal, to be used in the first process, is prepared.

Figure 10, in Plate XV., represents the section of a kiln. *b*, is the wind or blast-hole; the parts marked *c*, *d*, *e*, *f*, are draft or air-holes; *a*, is the open top or mouth of the kiln. Vegetable charcoal, prepared in the ordinary way, is placed in this kiln, and the kiln is fired; the smoke, vapours, gas, and flame, arising from the charcoal, passing out at the mouth *a*, of the kiln. When the appearance of smoke, &c. ceases, (if there is any,) and the mass has become heated to a cherry-red colour, the hole *b*, and the holes *c*, *d*, *e*, *f*, and *a*, are closed successively, till every aperture is shut up, and properly luted; then the charcoal, being allowed to cool gradually, will be fit to be used for the purposes of the first process, which is as follows:—

A quantity of vegetable charcoal so prepared, is reduced to a fine powder; and supposing the liquor to be thirty-two gallons of the ordinary syrups for making sugars, properly diluted, it is filtered through a bed of the above pulverised charcoal, from six to eight inches thick, and from one to two feet square. When this is done, the aecond process begins, which is as follows:—

The patentee takes one gallon of pulverised animal charcoal, for every thirty-two gallons of syrup, and not exceeding one per cent. of concentrated sulphuric acid; and these ingredients being well stirred through the liquor, the colouring matter and other impurities are disengaged. The sulphuric acid, which remains in the liquid, is precipitated with lime, in the usual manner. This done, the liquor is subjected to the third process, which is merely causing it to percolate or filter through a bed or filter of finely pulverised gypsum, about four inches thick, by one to two feet square; the absorbent qualities of which gypsum, complete the purification of the liquor.

As different juices and liquors will of course require different proportions of the said purified vegetable charcoal, and the said animal charcoal, and sulphuric acid, no general rule can be laid down; but the object of using these ingredients, having been explained, experienced practitioners, in the different branches of manufacture to which this invention is applicable, will find no difficulty in ascertaining the proportions necessary for their particular purposes.

The patentee claims, Firstly,—The use of vegetable charcoal, purified as aforesaid, for the purpose of absorbing the acids and essential oils of such liquors, as aforesaid.

Secondly,—The use of animal charcoal and sulphuric acid, together, for the purpose of clearing such juices and liquors, as aforesaid, and depriving them of their colouring matter.

And, Lastly,—The use of gypsum as a filter and absorbent, for the more perfect purification of such juices and liquors, as aforesaid.—[*Inrolled in the Rolls Chapel Office, May*, 1834.]

To JAMES GARDNER, *of Banbury, in the county of Oxford, ironmonger, for improvements in cutting Swedish turnips, mangel wurzel, and other roots used for food for sheep, horned cattle, and other animals.*—[Sealed 12th December, 1838.]

THE first of these improvements is a machine, in some respects similar to that for which a patent was granted to the present patentee, (dated Sept. 25th, 1834,*) for cutting Swedish turnips, mangel wurzel, and other roots, into large pieces, for horned cattle and other animals.

Fig, 1, Plate XVI., is a side section of the machine; *a, a*, is the case in which the turnips are cut; *b*, is a cylinder to which the knives are attached, the outside of it being formed into three steps to suit the shape of the knives; the smaller end is closed, and has a strong boss *c*, cast in it, through which its axis *d*, passes, the larger end being open; *e, e*, are the cranked or bended knives, of which there are two, attached to the cylinder *b*;—a front and side view of them is shewn at fig. 2.

The roots to be cut are thrown into the hopper *f*; then the cylinder *b*, being turned, by means of a winch-handle, attached to its axis, the knives come in contact with the roots, and cut them up; the pieces so cut fall out at the open end of the cylinder *b*.

The patentee likewise proposes to use knives of the form shewn at fig. 3; the surface of the cylinder *b*, will, in this case, be made level, having a series of grooves cut in

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* For Specification of this Patent, see Vol. VI., present Series, page 28.

it, corresponding to the shape of the knives, which are so placed that the one shall not cut in the same angle as the other. The knives, of the form shewn at fig. 3, may likewise be placed on one side of a wheel, which, when revolving, brings them into contact with the roots to be cut.

The second improvement, is a machine for cutting Swedish turnips, mangel wurzel, and other roots, into small pieces, for sheep and other animals; and differs from the former, inasmuch as the knives, in this instance, are stationary, the roots being brought into contact with them, by means of a ram.

Fig. 4, shews a side section of this machine; *g*, *g*, are knives, which cut the roots into lengths; and *h*, *h*, are other knives, which cut the pieces across their length, the roots being forced into contact with them by the ram *i*, which is worked by a lever. Figs. 5, 6, and 7, shew front and side views of the different forms of knives, which may be used in this machine.

The patentee claims, in the first place, the mode, above described, of applying cranked or bended knives, in constructing a machine for cutting mangel wurzel, Swedish turnips, and other roots, for food for sheep and other animals; and secondly,—the different arrangement of the knives, and construction of a machine, used in conjunction with a ram, for cutting mangel wurzel, Swedish turnips, and other roots, for food for horned cattle and other animals.—[*Inrolled in the Inrolment Office, June*, 1839.]

To Henry Smith, *of Birmingham, lamp manufacturer, for improvements in gas burners, and in lamps.*—[Sealed 25th March, 1840.]

This invention is an improvement upon Bynner's patent for lamps, commonly known as "solar lamps."

The improvement before us will be better understood by briefly referring to the principle of Bynner's patent solar lamp, which consists in causing the air, to support combustion, to be forced on to the flame a little above the point of ignition. To effect this object, Mr. Bynner has covered the burner with a cup or cone, with a hole in its apex, for the flame to pass through. The air, to support combustion, passes up between the cup or cone, (called by him a "deflector,") and the burner, and is caused by the deflector to impinge upon or strike the flame at right angles, or nearly so thereto. This deflector is made of metal, and as it covers up or conceals the lower part of the flame, a considerable part of the illuminating property thereof is unemployed.

The present invention consists merely in making the lower part of the "deflector" of glass, instead of metal; or in constructing the deflector in such a manner that the full benefit of all the light, emitted by the flame, may be obtained.

The patentee has shewn, in his specification, three methods in which he carries his invention into effect.

Figs. 1, 2, 3, 4, 5, 6, and 7, in Plate XVI., represent the methods proposed by the patentee. Fig. 1, is a sectional side view of the first method. *a*, is a common Argand gas burner; the glass chimney *b*, is supported by the gallery *c*, in the usual manner; *d*, is the lower part of the deflector, and is made of glass; *e*, is the upper and essential part. Fig. 2, is a section of the deflector, detached from the burner. The air, to support combustion, passes up between the burner and deflector, and impinges on the flame, as denoted by the small arrows in fig. 1.

A second method proposed, is shewn at fig. 3, which represents the deflector as connected to the gallery. In this figure, the burner and flame are shewn by dots;—the deflector *e*, is attached to the upper part of the gallery by supporting pins *f*, *f*.

Fig. 4, represents the third method, in which the deflector *e*, is supported in the glass chimney by means of an annular spring, seen in plan at fig. 5. The deflector itself is made of metal, and is shewn in plan at fig. 6, and in elevation at fig. 7.

The patentee claims, firstly,—the mode, above described, of applying a deflecting surface, by means of a glass support, as shewn in figs. 1 and 2. Secondly,—the mode of applying a deflecting surface by means of wire supporters, on an open frame, as shewn at fig. 3; and thirdly,—the mode of applying a deflecting surface within the glass chimney, and retaining and supporting it there by means of a spring, as before described.—[*Inrolled in the Inrolment Office, September*, 1840.]

To William Brunton, *of Charlotte-row, in the city of London, engineer, for his invention of apparatus to facilitate and improve the excavation of ground, and the formation of embankments.*—[Sealed 2nd November, 1838.]

This invention consists, first,—in an apparatus, whereby the excavation of ground is effected, by cutting from the face of the excavation, successive thicknesses or strata, by means of a plough or series of ploughs, so applied, that the specific gravity of the ground will aid the operation of cutting it. Secondly,—in an apparatus, whereby the same advantage is obtained to assist hand labour; that is, the specific gravity of the ground is made to aid in loosening it, or rendering it easier to dig, by workmen using the ordinary excavating tools. Thirdly,—in an apparatus, whereby earth, in the formation of embankments, may be

conveyed for the extension of the base, to a greater horizontal distance, from the place where it is discharged from the waggons or barrows, than it would be conveyed by running down its own natural slope. Fourthly,—in an apparatus, for consolidating the materials of embankments, as they are formed, to prevent the ordinary shrinking thereof. Fifthly,—in an apparatus, for propelling the waggons between the cuttings and embankments, by a continuous or endless rope or chain, moved by a fixed steam-engine, or other suitable power.

The first part of the invention may be thus described:—A cutter, or series of cutters, are fixed to a beam, which, on its being moved longitudinally, urges the cutters into the ground, and causes them to displace it in the same manner as a plough; in which movement, the cutter beam is guided, by what the patentee terms the guide-frame, which lies upon the face of the cutting, and is moveable in the direction across the line, in which the cutters act, in order to bring them into fresh hold of the ground every succeeding cut. The guide-frame is moved by a pinion, taking into a rack thereto; which pinion receives its motion, by suitable gearing, from an engine or horse-wheel. The cutter beam, with the cutters, is likewise moved by gearing from the same engine.

The cutters *a*, fig. 1, Plate XVI., are attached to the gudgeon *b*, which rests in a saddle *c*; this saddle is screwed to the under-side of the cutter beam, and there are five or more of these sets of cutters attached to the cutter beam, at equal distances apart. The three cutters in each set, extend into the earth different lengths, in order to relieve one another; thus for instance, if the strata to be cut, be eighteen inches, the first cutter extends six inches; the second twelve; and the third eighteen. Previous to commencing the excavation with the cutters, the earth must

be brought to a proper slope by manual labour; if stiff clay, it is left nearly horizontal; but if loose earth, it is brought to a gentle slope, and a groove is then formed for the reception of each set of cutters. This is done by means of a rod of wood or iron, provided with pins, one foot apart, down its whole length; this rod is the same length as the cutter beam, and receives its motion from the same source. In order to form the groove, a workman places the blade of an excavating tool in the earth, in the line intended for the groove; the rod then descends, and one of its pins, catching against the tool, forces it down the slope, and thus forms the groove; the workman accompanies the excavating tool down the slope, and guides it by means of its handle. The cutters being now placed in the groove, commence ascending, cutting the earth in the same manner as a plough; and by means of the incline, each set cuts into a lower stratum than the one immediately preceding it; so that if there are five sets attached to the cutter beam, and in operation, the highest set will be cutting into the remains of the first stratum, while the lowest set will be commencing the fifth stratum; and the specific gravity of the ground having a tendency to force it downwards, will loosen it, and so render it easier for the cutters to penetrate. As soon as the first cut is effected, the cutter beam descends, and is moved forward across its line of action, in order to take a fresh hold of the ground; being raised from the surface of the ground by a crane, during this movement.

The patentee does not claim, as his invention, the application of ploughs to cut or excavate ground; but he claims the application of ploughs or cutters, for excavating ground in successive strata, in such manner, as to render the specific gravity of the ground, so cut, serviceable to the operation.

In order to obtain the means of digging ground by hand labour, where its specific gravity assists the workmen, a series of stages or platforms *a*, fig. 2, are constructed, suited to the dimensions and shape of the intended excavation. These stages are from 7 ft. 6 in. to 9 ft. asunder, connected to the beams *b*, and are also supported by the chains *m*. The whole are supported by levers *c*, resting upon moveable carriages *d*, which are supported and moved upon beams of timber *e*, laid, for this purpose, upon the ground in advance of the cutting. The stages are borne off the face of the cutting by the gye chains or ropes *n*, attached to the lower end of the stage frame, by the cranes *i*.

The operation of excavating is thus conducted: first,—the men in the lowest space, undercut the ground, in the usual manner, to the proper depth of the thickness intended to be excavated, as high as 1, from which the men on the first stage, prosecute the same stratum as high as 2; thence it is continued by the men on the second stage to 3, and lastly, cut out to the surface, by the men on the third. But the workmen on the stages, as well as those at the bottom, carry on their work simultaneously; therefore, where there are three stages in operation, there are parts of four strata, cutting at the same time; that is, the men on the third stage, are removing the remains of the first of the four strata; those on the second stage, are cutting the second stratum; those on the first stage, the third; and those at the bottom, the fourth.

Whilst the workmen cut the ground, and discharge it by wheelbarrows into the waggons *h*, through the shoots *g*, the stages are gradually raised, so as to elevate the men to their work, as shewn by the dotted lines 4; and when each set of men have extended their cutting to the desired height, the stages are lowered, and the gye rope lengthened,

so that each set of men exchange their places of work upon the face of the cutting, with those immediately below them. The means of elevating the stages, by the crane *k*, and lengthening the gye rope by the crane *i*, will be evident to any competent mechanic. The moveable carriages *d*, are drawn onwards, as the work progresses, by means of the crane *f*.

The levers, which support the stages, called wing stages, whereby the ground is cut over the slopes, must, whilst they are raised, have also a side motion to suit them to the degree of slope. This is given by a pinion and segment, similar to the ordinary method used for turning wharf cranes; and, in order that there be a continuous stage for the men to work upon between the wing stages and the middle stage, a light platform is constructed, which is hinged or fastened to the wing stage, and rests and moves upon the middle stage during the said lateral movement.

The patentee does not claim, as new, the invention of stages, on which men may excavate ground, but he claims, as new, the application of them under the circumstances herein described, whereby the workmen are brought to dig or loosen the ground, in successive strata, where the specific gravity of it continually assists the operation.

The apparatus, for conveying earth to a greater horizontal distance than it would be conveyed by running down its own natural slope, is composed of a number of rollers *l*, fig. 3, about three or four feet long, moving freely round their axes *p*; these rollers are fitted into a frame, which is composed of two sides, to receive and support the pivots or gudgeons of the rollers, at distances as close as consistent with their working perfectly free of each other. Each of these rollers is provided with two or more grooves for the reception of the links of two or more endless chains, which chains pass round the two end rollers, and along the sides

of the other rollers. Into the links of these chains, and about three or four inches apart, are inserted laths *m*, which are covered with thicknesses of coarse sacking. This set of rollers is placed in an inclined position from the top of the embankment to the place where it is designed to deposit the earth. Now, it will be evident, that when any earth is thrown on the top of this apparatus, and the rollers are made to revolve, the earth will be conveyed to the place required.

The patentee likewise proposes to use two of these sets of rollers, one below the other; the lower part of the upper set being over the upper part of the lower set;—by this means, the distance of the place, where the earth is to be deposited, may be varied at pleasure.

The patentee does not claim, as new, rollers applied in the manner herein described; but he claims the adaptation of such an apparatus to the removal of earth in making an embankment.

The apparatus for consolidating the materials for embankments, is composed of two cylinders *r*, fig. 4, one of which is mounted in a large frame *s*, its axle being placed at right angles thereto; the other cylinder revolves on an axle, mounted on the frame *t*, which moves on its axis *u*, in the centre of the frame *s*, and is turned laterally, right or left, by means of the sector rack *g*, and pinion *h*.

The movement is effected by turning the pinion *h*, which takes into the segment *g*, attached to the frame *t*; and as this movement turns the front roller a little on one side, the machine may be made to travel either in a straight or curved line, at pleasure. This machine is propelled by the endless chain or rope *b*, which is passed round a drum affixed to a steam-engine; from thence it proceeds through a pulley, placed on one side of the embankment; then

round the pulley *a*, of the machine, and through a pulley at the opposite side of the embankment; and then back to the drum of the engine. As the drum revolves, the endless chain causes the machine to proceed onwards, (acting in the manner of a garden roller,) by turning the pulley *a*, which communicates its motion by the wheels *m*, *n*, *o*, to the cylinders *r*. The movement may be reversed, by turning a handle attached to the part *n*.

The patentee does not claim originality in the construction of any of the mechanism of the machine, for consolidating embankments, nor of the drum, for giving it motion; but he claims the application of it to the consolidation of embankments.

The fifth head of the invention is thus explained:—A double line of rails is laid from the cutting to the embankments, for the waggons to travel on; and in the centre of each end of both lines of rails a large pulley is placed; an endless rope is passed round the pullies, and round the drum of a fixed engine. The waggons are attached to this rope by catching it between the jaws of a wooden vice or tongs; and, by means of the arrangement of the pullies, the waggons proceed to the cutting upon one line of rails, and from it on the other line.

The patentee does not claim, as new, the arrangement of the endless rope, for propelling waggons by the power of a fixed engine, but he claims the application of it to the purposes of conveying earth from a cutting to the formation of embankments.—[*Inrolled in the Inrolment Office, May*, 1834.]

To DANIEL LEDSAM *and* WILLIAM JONES, *both of Birmingham, in the county of Warwick, screw manufacturers, for their invention of certain improvements in machinery, to be used in the manufacture of pins and needles.*—[Sealed 21st November, 1833.]

THESE improvements consist, firstly,—in a peculiar arrangement of machinery, for carrying pins for pointing; and, secondly, in another arrangement of machinery, for carrying needles for receiving points.

Figs. 1 and 2, Plate XVI., shew these improvements, applied to carrying pins to be pointed; *a*, is a wheel, (seen in fig. 2,) keyed on the shaft *n*, having a strap of wash-leather *m*, fastened round it; *b*, *b*, are two rings, provided with teeth, travelling on collars, affixed to the wheel *a*, the rings turning, independently of the said wheel; *c*, is the revolving grinder, for forming the points of the pins, having two grinding surfaces, over which the pin passes in succession; the first surface forming a short point, and the second lengthening the sides of the point, so as to bring it to the regular shape of a pin's point. *h*, is a pulley, by which the grinder is turned; *i*, is a bar, which pushes the pin underneath the spring *k*, into the teeth of the rings *b*, the pin being kept parallel to the shaft *w*, by the spring *k*; *j*, is a stud, (attached to the bar *r*,) which works in a slit cut in the bar *i*, which bar *i*, is moved backwards or forwards as the bar *r*, ascends or descends; *l*, is a strap of wash-leather, passing round the under part of the wheel *a*, the strap being either tightened or loosened by turning the nuts 13, and 14; *n*, is a wheel, keyed to the shaft *w*, on one side of the wheel *a*; the wheel *n*, has a groove cut round it, for the reception of the head of the pin; *o*, is a washer on the other side of the wheel *a*; *p*, is a toothed

wheel, which is attached to the shaft *w*, and turns a pinion *s*, affixed on the shaft 10; on which shaft is also keyed the toothed wheels *t*, *t*, which wheels communicate motion to the toothed rings *b*, *b*; the length of the shaft 10, can be varied by the screw 15; *u*, is a collar, by means of which, with the nut *v*, the washer *o*, the wheels *a*, and *n*, and the toothed wheel *p*, are held together; besides being keyed on the shaft *w*, one end of which, is formed into a screw, to receive the nut *v*. Motion is communicated to the shaft *w*, by suitable gearing, not shewn in the drawings; *x*, is a plate, provided with a groove for the reception of the pin's head, corresponding to that cut in the wheel *n*; the head of the pin being brought to the right shape by passing between the wheel *n*, and the plate *x*; *y*, is a screw, by means of which, the distance of the plate *x*, from the wheel *n*, can be regulated; 1, is a box, in which the revolving grinder *c*, is contained; 2, is a projection formed in the bottom of the box, through which the rod 3, passes; the rod 3, has a screw formed at its lower end; and a nut 4, raises the rod 3, by turning the screw; 5, is an eye, formed on the top of the rod 3; through this eye the stem of the prongs 6, passes; the end of this stem is formed into a screw, and is secured, on the other side of the eye, by the nut 8;—7, is the axis, upon which the revolving grinder turns; 9, is a screw, for retaining the rod 3, at the required height; 11, is one of two ears, formed at the bottom of the box 1, through which ears, the screws 16, pass, the bottom of the box sliding on them, in order to adjust the revolving grinder correctly; 12, is a screw, by which the bottom of the box is moved.

The following is the mode of operation:—The pin, after having its head formed, is passed between the bar *i*, and the spring *k*; the bar *r*, then descends, and by means of its stud *j*, drives the bar *i*, forward; this bar then pushes

the pin under the spring *k*, and between two of the teeth of the rings *b*, *b*, which rings, as well as of the different wheels, are now revolving. The bar *r*, then ascends, and draws back the bar *i*; and another pin is placed between the spring *k*, and the bar *i*; and that bar is moved forward as before, a pin being received between every two of the teeth of the rings *b*, *b*. The pins are kept in their places, as they descend to be ground, by the wash-leather *l*; and by means of the wheel *a*, they are also made to revolve as they descend, and pass over the grinder, as the wash-leather *m*, on the surface of the wheel *a*, rubs against the wash-leather *l*. After passing over the grinder, the pins proceed to the plate *x*, and as their heads pass between that plate, and the wheel *n*, they receive their proper form, and the pins are finished.

Fig. 3, shews these improvements, applied to carrying needles to be pointed. The same letters and figures are used to those parts in this drawing, as are the same in the other drawings. *c*, 1, and *c*, 2, are two revolving grinders, which, in this instance, are formed of stone; they are turned by the pullies *h*; 20, are frames in which the grinders revolve, turning on the axes 25: 21, are the forked supports of the frames 20; 23, is a shield, to prevent the grinder from forcing the needle-shafts out from between the teeth of the rings *b*, *b*; 24, is a plate, which bends the needle-shafts down upon the grinder, in order to form the point,—each grinder having a shield 23, and a plate 24. The needle-shafts pass under the hooked piece 26, and are thereby caused to enter between the teeth of the rings *b*, *b*, by which they are carried forward to the grinders.

The following is the mode of operation:—After the needle-shafts have been cut into lengths, sufficient for two needles, they are passed under the hooked piece 26, and descend down its inclined plane, to the spaces between the

teeth of the rings *b, b*. Descending, they pass over the two grinders, one end of the shafts being ground by the first grinder; from which they pass to the second grinder, where the other ends are ground; after which, they are finished in the usual manner.

The patentees lay no claim to any of the parts separately, of which the machinery is composed, nor in combination, other than what is hereafter particularly mentioned, and distinctly claimed; nor do they claim the causing of the pins and needles to revolve by the wash-leather straps, that being similar to their former patent; nor the forming or finishing the heads, as above described; nor the rolling of the head between the wheel *n*, and the plate *x*; but they claim the combination of the parts *a, b, b*, and the parts which actuate or work them, for the purpose of carrying pins and needles to be pointed, as above described, whether the same be used in combination with the parts herein described, or with other combinations, for effecting the other parts of the process of making pins and needles.—[*Inrolled in the Inrolment Office, May*, 1834.]

To THOMAS WELCH, *of Manchester, in the county of Lancaster, cotton spinner, for his invention of a new method of taking up, for power and hand looms.*—Sealed 5th October, 1833.]

THIS invention consists of a new mode of producing a varied degree of speed in taking up cloth. The cloth is wound in folds or thicknesses on the cloth-beam,—every additional fold increasing its diameter; so that each succeeding fold is wound on with a greater degree of speed than the one preceding it, whereby the texture of the cloth is

impaired and loosened, and the number of picks, to an inch, is lessened. The following is the mode of applying this invention to a power loom :—

A block of wood is provided, which the patentee calls a saddle, the face of which is hollowed out, so as partially to clasp the cloth-beam, and the greatest diameter of cloth taken up at one time. This saddle is connected by a joint pin, with the short side arm of an upright crank-lever, affixed to the framing of the loom; from the centre of this lever, a long front arm protrudes, having a forked end, which guides an endless strap or band, that passes over two conical drums, one of which is fastened on the tappet-shaft of the loom, its broadest end being nearest the centre of the shaft; the other drum is fastened on a counter-shaft, near the cloth-beam, its end being farthest from the centre of the shaft. Motion is communicated to this drum from the drum on the tappet-shaft, by means of the endless band above mentioned.

The outer end of the counter-shaft is provided with a pinion, which drives a series of wheels and pinions ;—these communicate motion to a wheel, fastened on the end of the cloth-beam, which is thus caused to revolve. One of the wheels, and one of the pinions above-mentioned, are provided with a catch-box, to which is attached a spring-lever, by which they may be thrown in or out of gear, as occasion requires.

Now it will be evident, that the diameter of the cloth-beam, being increased by every succeeding fold, it will gradually push the short side-arm of the crank-lever back, by pressing against the saddle; by this means, the lever will be turned partly round, and its long arm will cause the endless band to traverse towards the pointed end of the drum on the tappet-shaft, and towards the broad end of the drum on the counter-shaft; by which means, the

last-mentioned drum will be caused to revolve more slowly; therefore slower motion will be communicated to the cloth-beam, by the wheels and pinions; but the cloth will be wound on with the same degree of speed as at first, owing to the increased diameter of the cloth-beam.

In order to insure steadiness of action, when applying this invention to the taking up of cloth, having a large number of picks to the inch, the patentee adopts the following arrangement of parts:—From the back of the saddle, a flat bar of iron extends, and is formed into a rack;—this bar travels in an eye, attached to the centre of a bar, one end of which is fastened to the breast-beam of the loom, and the other end extends out, and forms a support for an upright axle. To the upper part of this axle is fastened a a small spur-wheel, which is worked by the rack before-mentioned; and to the lower part of this axle is fastened a large spur-wheel, which works a rack, provided with a pair of prongs;—these prongs act on the endless band, in the manner before described.

The saddle is kept in contact with the cloth-beam, by means of a spring, and the other parts remain the same as before,—the motion of the cloth-beam being varied by the traversing of the endless band.

The following is the mode of applying this invention to a hand loom:—The saddle, upright crank-lever, and its arms, as well as the pinions and wheels which turn the cloth-beam, are the same as in the first instance, with the exception of the catch-box and spring-lever, which are removed, for the reason hereafter axplained.

The drum, which was before on the tappet-shaft, is now fastened on a crank-shaft, having two cranks, and is steadied in its revolutions by a fly-wheel, at one or both ends. This shaft is turned by two crank-arms, extending from the lathe to the cranks, and it communicates motion, by means

of an endless band, to the other drum, which is fastened on a counter-shaft, the endless band being caused to traverse by the long arm of the lever, in the manner above described.

It will be seen, that when the lathe stops, the whole must stop; therefore the catch-box and spring-lever, for throwing the wheels and pinions out of gear, in order to stop the cloth-beam, is rendered useless.—[*Inrolled in the Inrolment Office, February*, 1834.]

To JOHN COOPER DOUGLAS, *of Great Ormond-street, in the county of Middlesex, Esq., for a method of constructing an apparatus or apparatuses, from which a motive principle of power is obtained; likewise for increasing the said motive principle, applicable to various denominations of locomotion, and to machinery that is stationery; and also for raising solid and fluid bodies, and various other useful purposes;—and also for constructing and forming apparatus and vehicles, to be propelled or worked by means of the said power.*—[Sealed 29th March, 1834.]

THE patentee says in his specification, that the first part of the invention consists of certain arrangements of mechanism whereby he is enabled to benefit by the law of nature, that when an equal pressure of superincumbent atmosphere is upon a body, that body will be at rest; but on the contrary, when the said pressure is unequal, the body will move, until it arrives at an equilibrium.

It is well known, that if a cask, filled with any liquid, and being firmly closed at all points, be tapped with a small hole at the lower portion, no liquid will flow out, unless a

small aperture be also made, somewhere above the surface of the said liquid; and the flow of liquid will be stopped, whenever the upper small aperture is closed again; and by alternately opening and shutting the said aperture, the liquid will also be alternately allowed to flow, or not allowed to flow, through the lower aperture of the cask.

This law is applied in the following manner, for the purpose of obtaining motive power:—Fig. 1, Plate XV., is a horizontal section of the arrangement for obtaining a motive power. Fig. 2, is an elevation of the same. Fig. 3, is a horizontal view of the segment wheels *l*, and *m*. *a*, and *b*, are two pistons; *c*, *c*, are chambers containing water, (or other liquid,) and are situated within a cylinder, accurately bored; which cylinder is made double, treble, or single, and the outer jacket is filled with a liquid. *d*, is a fixed division, for making a complete separation between the two ends of the cylinder, and between the two pistons. The pistons and piston rods are forced outwards, by a lever, or other suitable mechanism, so as to leave the chambers *e*, *f*, without anything in them, each being a vacuum;—an air-pump or air-pumps, may be used to exhaust the chambers. At each extremity of the cylinder is a small valve, marked *g*, and g^1; when g^1, is opened at one end, and *g*, is shut at the other end,—the pressure of the atmosphere, to fill the vacuum *f*, being resisted by the strength of the frame *h*, the whole cylinder and frame will be forced in the direction of the arrow, in figs. 1 and 2.

When the atmosphere is admitted by the valve, it presses not only on the surface of the water, which presses the piston, but also on the inner surface of the cylinder heads, which counterbalances the external pressure. *i*, *i*, are small truck wheels, by which the frame *h*, is made to run in the parallel motion *j*, *j*. As soon as this apparatus has arrived at the end of the parallel motion or guide, the valve

g, is opened, by means of a tappet or other convenient motion; whilst, by the same motion, the valve g^1, is shut;—thus the apparatus is caused to run back again.

By continuing to open and shut, alternately, these valves *g*, and g^1, the alternate rectilinear motion is obtained, which may, by any approved mechanism, be converted into other motions. The motion of the cylinder and cylinder frame, in the outer frame, will resemble the motion of a shuttle. *k*, is the main shaft; where, in this case, a circular motion is obtained, by means of the two segments of wheels *l*, and *m*, and the double rack *n*.

The second part of the invention consists of a method of increasing the said motive power, so that instead of a crank-motion, the double rack *n*, is used; whereby the two semicircles of teeth are made to revolve, so as to give and maintain a continuous uniform power round the circle. According to the length of the radii of these segments, so is the increased power.

Fig. 4, shews part of a beam, to which the motive power has been applied, in the manner above described, and which may be used for pumping up liquids. It may also be used for raising weights, whether solid or fluid, and for propelling the same through the atmosphere.

The fourth head is described as consisting of a method of construction, whereby the necessity of paddle-wheels, for marine locomotion, is obviated, whether such marine locomotion is obtained by means of the motive power above described, or by the aid of steam, or any other power.

The motion is communicated to any part of a crank-shaft, placed in the bow of a vessel. This crank-shaft works two propellers, provided with paddle-boards, and which propellers are assisted in their backwards and forwards motion, as well as the ascending and descending to and from the water, by a series of levers and connecting rods, attached

to a frame, which extends over the bow of the vessel. The propellers are alternately extended to their greatest length; and then, their paddle-boards entering the water, they are drawn towards the vessel, thus propelling it through the water; then, as soon as they have travelled the required distance towards the vessel, they are raised, and proceed forwards again The patentee uses four such propellers for a steam boat.

The invention consists, fourthly, of a method of preventing vessels from sinking or upsetting. Cylindrical or other shaped vessels, filled with air, or made buoyant by other means, are attached to the boat under the gunwale, and so prevent it from sinking.

Fig. 5, shews the mode of preventing a boat from upsetting. *d, d,* are buoyant vessels, suspended over each side of the vessel, and protected by iron gratings or bars; and which buoyant vessels, as they touch the water, press up the long arms of the levers *a, a.* These levers are rested on the fulcrums *b, b,* and their short arms press upon the frame *c, c.* By this means, when the boat heels to one side, the long arm of the lever on that side is raised up, and the short arm of the lever is depressed; by which means, it also presses down the opposite side of the boat, and thus she is kept on an even keel.

Fig. 6, represents a similar arrangement, applied to prevent the upsetting of carriages.

The fifth part of the invention consists of a mode of applying the new motive power to carriages; also improvements in the construction of carriages. The prime mover, shewn in figs. 1 and 2, is attached to the perch of the carriage; and the valves *g,* and *g*[1], are opened and shut, by hand, or any suitable mechanism.

The patentee recommends that the back seats of the carriage for passengers, be made higher than the front.

The sixth and last head, described by the patentee, consists of a mode of throwing projectiles, by means of the new motive power. In fig. 7, *d, d,* is the frame of an accurately bored cylinder *f*, which is open at the top; and this frame is attached to the piston rod *g*, of the motive cylinder *h*. The upper cylinder *f*, in this case, is only used as an air chamber, with a piston *k*, fitted well to it. On the valve *l*, being opened, the vacuum space at h^1, will be closed instantly; the piston will consequently be brought down suddenly, and the air in f^1, will drive the ball or other projectile at *m*, before it.

The patentee claims as his invention, the construction of an apparatus or apparatuses intended as a prime mover; provided such apparatus or apparatuses can be operated by the mere opening and shutting of any valve or valves, and thereby effecting a change of equilibrium, as before described;—whether the said motive power be applied for the various purposes to which steam power, or horses, or manual labour, or any other power, be now applied;—and whether it be for discharging and projecting missiles, or for impelling balloons, or blowing or pumping air, or any other useful purposes. He also claims the method herein-described for obtaining the said new motive power, an increased power, in proportion to the radii of the segment wheels, upon which the rack acts. He likewise claims the application of any moveable buoyant body, acting upon levers, in such manner as to throw the pressure of a boat's or vessel's tendency to upset, to the other side, so as to bring her again on an even keel.

He further claims the application of any moveable body, acting upon levers, in such manner as to throw the pressure of a carriage's tendency to upset, to the other side, so as to keep the centre of gravity of the carriage in the proper position. Moreover, he claims the use of propellers, worked

by the vibration of a beam, or by any reciprocating or circular motion, provided such propellers are used for hauling any vessel forward or backward, whether the motive power be that above described, or steam, or any other power.

The patentee does not limit his claims to the forms of construction above described, as they may be made of any other form to accomplish the same end; and the various parts may be made of any suitable material.—[*Inrolled in the Rolls Chapel Office, September,* 1834.]

Scientific Adjudication.

ROLLS COURT.

Wordsworth *v.* Sharp.

This case came before the court on the petition of Joshua Wordsworth, of Leeds, machine-maker, against John Sharp, of Dundee, in the Kingdom of Scotland.

A patent was granted in England to the said John Sharp, dated 6th October, 1836, for his invention of "certain machinery for converting ropes into tow, and certain improvements in certain machinery for preparing hemp or flax for spinning, part of which improvements are also applicable to the preparing of cotton, wool, and silk, for spinning." This invention was duly specified and inrolled in Chancery, and the particulars of the said improved machinery fully set out and explained by drawings.*

A patent was also granted in England to the said Joshua Wordsworth, of Leeds, for his invention of certain improvemenst in machinery for heckling and dressing flax, hemp, and other fibrous materials, dated 31st May, 1838, (for the specification of which see Vol. XVI., page 264, of the present Series of our Journal.)

Subsequently to the grant of Wordsworth's patent, (viz. in

* The Specification of this Patent we have not yet been able to report in our Journal, but it will appear in our next Number.

September, 1838,) Sharp applied to the Solicitor-General, (Sir R. M. Rolfe,) for leave (under Lord Brougham's Act) to amend the inrolled specification of his patent of 1836, of which notice was duly advertised; but Wordsworth knowing that the inventions, described in Sharp's specification, had no sort of resemblance to those for which he (Wordsworth) had just obtained letters patent, and not wishing to prevent Sharp from correcting any errors that he might have fallen into in describing his said machinery, (nothing but the correction of errors being allowed by the act,) entered no opposition to the alterations of the specification, which, being allowed by the Solicitor-General, was inrolled accordingly, and became part of the original specification.

It appears, however, that notwithstanding the words of the act expressly limit the permission to the entering of a "*memorandum of any alteration in the said title, or specification; not being such disclaimer, or such alteration as shall extend the exclusive right granted by the said letters patent,*" that the Solicitor-General allowed a document to be inrolled, containing descriptions of several other inventions not contemplated in the original specification; and with some introductory words, like—"I sometimes construct my machines in the following manner," went on to describe the particular heckling machine, for which Wordsworth had recently obtained a patent, and which was then in public use, but the specification had not then been inrolled.

Wordsworth having discovered this violation of the law to his prejudice, petitioned the Master of the Rolls to remove the amended specification of Sharp from the record, alleging that his interest was very materially affected by the existence of such document; although he was advised, that its illegality gave it no validity in law.

Much difficulty arose from the Rolls Court not having jurisdiction in Scotland to serve the proper notice on the defendant; but at length, service upon the solicitor, in London, who had conducted the business for Sharp, was deemed sufficient, and the case came on for hearing 6th November, of which the following report contains the arguments on both sides:—

By statute 5 and 6 William IV., c. 73, "to amend the law touching letters patent for inventions," it is enacted "that any person having obtained letters patent for an invention, may enter with the clerk of the patents (having first obtained the leave of the Attorney or Solicitor General) a disclaimer of any part of his specification, or a memorandum of any alteration therein, which is to be deemed part of such specification." Wordsworth's petition stated, that letters patent were granted, in October, 1836, to Sharp, to make and vend his invention, part of which the petitioner stated was applicable to the preparing cotton, wool, and

silk, for spinning. The specification was inrolled in April, 1837. In May, 1838, letters patent were granted to the petitioner Wordsworth, for an invention of improvements in machinery "for heckling and dressing flax, hemp, and other fibrous materials," and in November following the specification was inrolled. The petition then stated, that after this inrolment he (Wordsworth) discovered that Sharp had, in September, 1838, obtained from the Solicitor-General a certificate that Sharp had applied for leave to enter with the Clerk of the Patents certain memorandums of alterations of parts of his specification, and that the Solicitor-General had directed him to advertise the alterations, which was done; and, no objection having been made, the Solicitor-General granted leave to Sharp to file the memorandum of alterations, which alterations the petitioner stated were a new arrangement of machinery, and extended Sharp's patent to what were in substance his (Wordsworth's) inventions, as described in his specification. The petitioner submitted, that the statute did not authorize the addition to a specification of any description of new machinery, and prayed for expunging the memorandum of alterations.

For the petition, it was argued by Mr. Pemberton and Mr. James Russell, that the Master of the Rolls (in whose custody the rolls of the Court of Chancery were) had authority to permit alterations to be made in the rolls, and his jurisdiction for that purpose remained unimpeached by the act of William IV. The jurisdiction originally inherent in this court had been acted upon under the Municipal Corporation Act in question, respecting the authority given to the Lords of the Treasury of interfering with the rolls of the court in the cases of "The Attorney-General against the Corporation of Liverpool," and against the Mayor of Poole, where it had been laid down by the Lord Chancellor, that *to exclude the jurisdiction of one court there must be not only another tribunal created, but an absolute exclusion of all other authorities enacted.*

In a case of charitable trusts, which were to be exercised in such manner as the Lord Chancellor should direct, there was an appeal from the direction to the House of Lords, in which the question, whether that house had jurisdiction, was not decided, but the opinion expressed was, that they had not. In "the Attorney-General against Norwich," the judges were unanimous against the jurisdiction of the House. To exclude the jurisdiction of this court there must be an express legislative exclusion; and the mere giving an authority to another tribunal would not have that effect. Where a clerical mistake was established that might be corrected. Every court had an entire control over its own records, as the Court of Common Pleas had over fines and recoveries; whether the error were clerical or otherwise, it made

no difference, for the record was not in the state it ought to be. The rolls of this court were under the control of the Master of the Rolls, and the state in which the records ought to be was subject to his determination, which must control the opinion of the Solicitor-General. The memorandums of alterations were filed with the specification, and became part of it. Had there been an alteration by erasure and substitution of other words, a difficulty would have been created; but there was no difficulty here in ordering the memorandum to be taken off the rolls. The act had not given the Solicitor-General power to decide conclusively and without appeal what should or should not be on the rolls, nor had it excluded the jurisdiction of the judges of the court over its rolls. Suppose *per incuriam*, or by mistake in his clerk, a fiat for an inconsiderate alteration had been given, or suppose the fiat had been attached to a wrong memorandum, the Solicitor-General would have no authority, after he had given his fiat, to correct any mistake or fraud, nor would there be any means of making such correction if the jurisdiction of this court were taken away. The effect of the fiat was merely that certain things should be placed upon the record, subject in all respects to the same conditions as the other records were. If the memorandum were not warranted, the court could take it off. Had the statute made the fiat absolute, that could not have been done; but the fiat left the jurisdiction precisely in the same state it was in before, and it was for his Lordship to determine whether the memorandum of alterations ought or ought not to remain a record of the court, and if not, his Lordship had jurisdiction to order it to be removed. He did not contend that his Lordship could order a patent to be taken off the rolls of the court, on the ground that the invention was not new, but whether his Lordship was to decide whether such circumstances had existed as could justify the memorandum being put upon the rolls. The question was not to be determined by the law officers of the Crown without the control of any other authority. The act had not declared their fiat conclusive, nor had it extended any right given by the letters patent. The Legislature prevented the record being altered at the mere will of the parties, enacting that there must be the leave of the Attorney or Solicitor-General. Their fiat was not to extend the exclusive right granted by the letters patent, but this fiat extended those rights; therefore the memorandum of alteration was not such as the act allowed, and if so, the fiat was good for nothing. It might be said, that if the memorandum is not warranted by the act, the objection might be taken in an action at law; but the answer to that would be, that the alteration is incorporated into the letters patent, and alters the specification; and although the petitioner, in an action at law, might say the invention, as specified in the

alteration, was neither new nor useful, he could not say it was no part of the specification, and he might have a right to have his action tried upon the original specification. If the fiat were conclusive, the alterations could not be averred to be no part of the record, for the statute had made them part of the record so long as the fiat remained. Unless the court had jurisdiction, the fiat would, in altering the records of the court, be conclusive, not only against the court, but against the Attorney and Solicitor-General themselves, for the act had not provided a mode of amending any mistakes they might have been led into. Where surreptitious or forged documents were discovered to be placed upon the rolls of the court, it would be no answer to an application for their removal to say, that an action could not be brought upon them. The court would order an invalid instrument to be delivered up, on the ground that it formed a cloud upon the title of the individual whose interest was sought to be affected by it.

Mr. Hill, and Mr. Bacon, for Mr. Sharp, against the petition, said, the arguments for the petition were, that the specification, with the alteration, was a record of the court; that such records might be amended by his Lordship; that the prayer was in substance for an amendment; and that the petitioner had that interest in the question which authorized him to make the application. The specification, with the alterations, might, for many purposes, be a record, but under the colour of that general term, inferences not quite sound, had been drawn. The patent was granted upon a proviso that the patentee should, at a certain time, enroll a specification; but that proviso did not give the specification any of those high attributes of records which had been claimed for it. A record imported verity, and if the petitioner's argument was well-founded, no person could defend an action in which the patentee could prove an infringement of his patent. But, from the statute of James I., these records had been treated only as the statement of a party who was bound to prove every averment he made, as that there was an invention, that he was the first inventor, &c. The patentee could not hold up his specification, and say "Here is a record, you are estopped from saying I am not the first inventor; my case was determined before we came into court." Nothing of that sort could be said. The specification was not a record in the sense and for the purposes for which that word had been used, nor was the memorandum, incorporated in the specification, such a record. In one of the cases cited (Redmond's) there was a clerical error, and that which had been intended was not done. If that had been the case here, his Lordship might, but with considerable trepidation, go back and bring the intention and the act, which had parted company, into agreement again; but his Lordship had been re-

quired to erect the court into a court of appeal over judgment of the Solicitor-General, and to do what that officer might have done had he viewed the matter in a different light. Such a procedure would not come within the doctrine of amendments. It might as well be said, that the reversal by writ of error of a judgment at comon law was an amendment of the record; it was confounding things entirely different; it was not an amendment of the record, but the correction of the errors of an inferior court. In analogy to the practice of the common law, there must be something to amend by. The present was not a question of amendment. Before the statute of William IV. there was no authority that could enable a patentee to disclaim any part of his patent; it was a new power given to the Crown, and vested in its legal officers. By the common law the Crown had great powers in granting monopolies, which, by the statute of James, were restricted to new inventions, and to the term of 14 years; and where the patentee, by his specification, had made his claim too large, it was fatal to his patent; but the late act had given the Attorney-General power to permit the patentee to disclaim a portion of his patent When a power was created by the Legislature, and vested in a certain tribunal, then no other court had jurisdiction. The invention was only one condition—the inventor must have a patent and specification. The memorandum remaining on the files of the court decided nothing but that the memorandum was authentic; it did not decide that there was an invention, or that the patentee was the inventor. The alleged invention might not be new, but that would be no reason for taking the memorandum off the files of the court. A bill in equity was not taken off the files of the court because it contained false allegations. If a judgment were erroneous, it would be a reason to appeal from it, but no reason to take it off the rolls of the court. The difference was between what was genuine and what was authentic. He did not argue that all was necessarily genuine, but he did say it was all authentic, and the question was to try the authenticity. The argument for the petition went to change the whole course of proceedings in patents from the time of James I., and he would advise his friend, who was the inventor of the doctrine, to get a patent for it. Whether it would stand as a new machinery for trying the validity of patents by their specification before the Master of the Rolls, would be a question. It was said that whatever had any vice would be taken off the rolls of the court, which would not bear any thing on its rolls which contained an erroneous allegation. The question was, who was the new inventor? An issue could not be granted to determine the question of amendment. The Solicitor-General required advertisements to be made of the application to him, and gave it two hearings; so

that the fiat for filing the memorandum of alterations was not granted in haste, but after due consideration. The validity of patents ought not to be decided in the present mode of proceeding. The mode of trying these questions had been settled for years, and ought not to be altered.

Mr. Pemberton replied. As long as the memorandum of the alterations, with the fiat of the Solicitor-General, remained as part of the rolls of the court, it would not be competent for any person to deny that the memorandum was a part of the specification on which the patent was granted. The statute did not authorize the memorandum to be placed on the rolls, for the memorandum did not form part of the specification. He would ask, had the Crown granted letters patent with the alteration? If it had, the objection that his Lordship had no power to interfere would be good; but if the memorandum were improperly placed, then it formed no part of the grant, and his Lordship would remove it from the record, as he would remove a forged specification, or correct a clerical error.

Mr. Pemberton also contended, that the same rules did not apply to a memorandum of alterations as to an original specification, inasmuch as a patentee had a right to insert in his specification, and without any control, such a description of his invention as he pleased: and this was allowed, because he did it at his own risk, and his patent would only protect him in the use of such apparatus as he described; but he had no such right with regard to a memorandum of alterations, or he might introduce alterations which would extend the exclusive right granted by the letters patent;—a previous reference to the Attorney or Solicitor-General was prescribed to prevent this. If an alteration of such a nature were introduced, and in the present case it had been done, it might and ought to be interfered with and expunged, and that the power to do so must rest in the Master of the Rolls. Mr. Pemberton further observed, that neither a trial at law, nor a *scire facias*, would be attended with the same effects to Mr. Wordsworth, as expunging the memorandum; and that the application was necessarily novel, on account of the act having been passed but four or five years.

The Master of the Rolls said,—I confess at this moment I have doubts in my own mind how I ought to decide this case.—I think it will be more convenient for me to see a little more than I know, as to what has been done upon questions of this kind.—I shall take time to consider of it.

It is no doubt my duty, as an officer of the Court of Chancery, to have the custody of the records, and my duty to receive them; and in the character of recipient, I have no doubt at all about the jurisdiction which I must have, to see that that which is received, is that which is intended to be recorded by the party.

The records may be said to be records of judicial proceedings, and records of the acts of the parties, which are extremely different things. I am to receive such documents, which they present, as are records of their acts; and if it is shewn to me, as it has been on some occasions, that they have presented a document which is not an accurate record of their acts, (and I suppose, as in the case I have handed down, though I have not read it,) then I have taken infinite care—all the care that I was master of,—first of all to discover where the error arose, and then to satisfy myself whether it was an error;—and I have acted upon the principle upon which I think I ought to act.

Mr. Russell has mentioned a case, upon which, according to his statement, I may have ventured to do something, which at this moment, I think I ought not to have done, but I will enquire into that.

It seems to me, the jurisdiction is vested in me, as the recipient of a person who is to receive the documents entered by the party as the record of his act; and if it turns out that it is not his act, then there is, within limits, which ought to be carefully guarded, an opportunity of correcting that act,—which is a different thing from filing any record, and in any manner altering that record. I will, however, read over the papers, and see what has been done upon former occasions, in matters of this kind, and when I have had an opportunity of doing that, I will mention the case, and give my Judgment upon it.

The Master of the Rolls postponed his Judgment.

NOVEMBER 6th, 1840.

JUDGMENT OF THE MASTER OF THE ROLLS.

DEC. 22nd, 1840.

The case here is, that on the 8th of October, 1836, John Sharp obtained a patent for an alleged invention in machinery for converting rope into tow, and for improvements in machinery for preparing hemp or flax for spinning; part of which invention was also applicable for preparing cotton, wool, and silk, for spinning; and the specification of the invention was inrolled on the 8th of April, 1837.

On the 31st of May, 1838, the petitioner, Mr. Wordsworth, obtained a patent for an alleged invention "for improvements in machinery for heckling and dressing flax, hemp, and other fibrous materials."

After the date of this patent, in September, 1838, and before the specification of the petitioner's invention was inrolled, Mr. Sharp

obtained, from the Solicitor-General, an order or certificate, directed to the Clerk of the Patents, whereby it was certified, that the Solicitor-General gave leave to Mr. Sharp to file a certain memorandum of alteration of the inrolled specification, pursuant to the statute of the 6th William 4th, ch. 83.

The specification of the petitioner's invention was inrolled on the 30th November, 1838, before the petitioner had been informed of the memorandum of alteration filed by Mr. Sharp; and the petition now alleges, that the machinery, described in Mr. Sharp's memorandum of alterations, constitutes a new machinery, and claims the exclusive right granted by Mr. Sharp's patent; and says also, that it is in substance the same machinery invented by the petitioner, and described in the specification.

The petitioner complains of this proceeding as injurious to him, as it undoubtedly is, if the facts be as alleged; and it prays that such portions of the memorandum of the alteration of Mr. Sharp's specification, as are hereinbefore particularly set forth, and are in substance descriptive of the same machinery as was invented by the petitioner, as hereinbefore is mentioned, may be expunged from the memorandum of alteration, and the Rolls of the Court.

The question now is,—whether, supposing the facts to be as alleged,—I have authority to do what is asked by this petition? and I am very clearly of opinion that I have not.

Patents for inventions are granted for the purpose of each invention being inrolled in a limited time; and memorandums of alterations are allowed for the purpose only of correcting mere clerical or verbal errors; and I am of opinion I have no authority to make any alteration in the inrolment of the patent, or of the specification.

The party inrolling his specification, does it at his own peril; and if in his specification he expresses something by which his patent is rendered invalid, he must submit to all the ill consequences of that; and those who have a right to take advantage of it, must do so in a legal course;—they cannot require the Master of the Rolls to alter that which the patentee has claimed by the specification, or which the patentee has disclaimed by his specification, and compel the party to say something which he never intended to say.

There were very good reasons for relieving patentees from the risk and liability to which they were subject in the specification; and the 6th William 4th, authorised the disclaimer to be inrolled with the leave of the Attorney or Solicitor-General; and enacted, that when that was so done, the same should be deemed and taken as part of such letters patent or specification, in all courts whatever, from the time of filing the memorandum of alteration.

The memorandum of alterations now being part of the specification, I conceive it ought to be dealt with as such, and no otherwise. If it was alleged in the memorandum of alterations, that the specification contained verbal or clerical errors, by means of which something may be inrolled contrary to the true intention of the party; and if sufficient evidence were given of the fact, I should think myself bound to correct the error, and make the inrolment accord with the specification at the time of the inrolment; but it never has been supposed, that the Master of the Rolls has been permitted to alter the inrolment.

A party may have claimed too much, and thereby have made his patent good for nothing; or, may have omitted to claim something he was entitled to; but, on such grounds, the Keeper of the Record could not interfere on his behalf; and I apprehend, no attempt has ever been made to induce the Keeper of the Record to expunge, on his authority, some claim which the patentee desired to sustain, and was willing to defend in due course of law. The Keeper of the Record has no authority to decide, whether there is any extension, nor has he any means of investigating the truth and justice of the case. It is no part of his duty, when he receives the inrolment into his custody, to consider whether the Attorney-General or Solicitor-General has properly or improperly given leave to the party to file the memorandum, nor can he afterwards determine such question.

I delayed my decision, in order that I might give time to enquire what has been done in the Inrolment Office, and what has been done in the Court; and from the information I have received, it would seem, that it has always been usual to amend clerical errors, when clerical errors have been made in grants of the Crown, and so on. They have been done by the Master of the Rolls; sometimes under the authority of a warrant from the Crown; sometimes by the consent of the Attorney-General; sometimes by a reference to the Master of the Rolls; by the Lord Chancellor: and there is an instance of the inrolment being amended by the order of the Lord Chancellor, pursuant to an order of the Crown. The errors have been corrected by the Privy Seal; or in the original grant, at an early period, the inrolment was amended at the request of the grantor, who acknowledged it; but I have not been supplied with any case where the amendment has been made of the patent, but only of this kind:—In a case before Lord Gifford, the word "*wire*" had been written instead of the word "*fire*." In the case of Redman, which is reported, the inrolment was amended in respect of numbers and figures;—by Sir John Leach it was amended in respect of two errors, the word "*which*" being written instead of the word "*wheel*," and the word "*increase*" had been written instead of the word "*inverse*."

I have had cases before me of the same kind, and in every case which has occurred, it has been intended to do no more than to amend mere slips or clerical errors, made by the parties or their agents, who have, by mere inadvertence, or by mistake, made an inrolment which did not purport to be the true statement of that which the parties intended, at the time they made the inrolment.—Not only have the strict errors been altered, but in order to enable the parties to dispute it, it has been ordered that the order should be endorsed on the inrolment.

It does not seem that the Keeper of the Record, or the Master of the Rolls, has ever done that; and being of opinion that I have no jurisdiction to make any such order as is asked by this petition, I must dismiss the petition, with costs.

Scientific Notices.

REPORT OF TRANSACTIONS OF THE INSTITUTION OF CIVIL ENGINEERS.

(Continued from page 246, Vol. XVII.)

Captain Moorsom, in reply to some questions from several members, stated, that although the American locomotive engines had not strictly complied with the stipulated conditions, yet he considered them good serviceable engines, and it was the intention of the directors of the Birmingham and Gloucester Railway Company to have ten of them on their line. The price of the engine complete, including the import duty of 20 per cent., is from £1500. to £1600. One of the greatest advantages of the engines, is the facility afforded by the truck for going round curves—the same engineers managing indiscriminately the ordinary six-wheeled engines, and the American ones are observed to go faster round the curves with the latter than with the former. Round a curve of 10 chains radius, they had gone at a speed of 20 miles per hour. They run also quite as well on a straight road. He had travelled on them between Whitmore and Crewe, at the speed of from 30 to 40 miles per hour. They appeared less likely to be thrown off the rails than other engines, as in

some instances they had run over the short pointers of the Grand Junction Railway—the engineer had merely felt a slight jar, but no accident had occurred. He attributed this to the truck adapting itself so readily to the rails. The coke used in the trials was the same as that in daily use on the Grand Junction Railway, and was of average quality. The mode of attaching the tender to the engine was peculiar, and he conceived it to be advantageous, as it threw a portion of the weight upon the engine and was an assistance in starting. The engines, as they are now constructed, will do well for all ordinary speeds; but if higher speeds are required, a greater expense must be incurred, and certain alterations must be made in them.

Mr. Bury conceived the chief peculiarity of the engine to consist in the end of the boiler being placed on the moveable truck, which certainly enabled it to adapt itself easily to any curve in the railway. The cylinders are in the same position as those in the first of Stephenson's engines, and the other parts are as nearly as possible identical with plain engines constructed in England. The pointers on the Grand Junction Railway are constructed and placed in such a manner as not to throw off a carriage which might run over them, and a four-wheeled engine would not have been thrown off by meeting a closed pointer. To enable him to form a correct comparative estimate of the work done by these engines, it should be shown what power was exerted at the wheels. This was a clear mode of arriving at a result and comparison with other engines.

Mr. Donkin remarked, that the flanches on the wheels appeared to be all that retained them on the rails, and that the truck turning on a centre-pin would allow considerable lateral friction, unless there was some mode of keeping the truck in a proper position when on a straight line of railway. If this kind of engine is superior to those generally in use in this country, it must be in some part of the construction which is not shown in the model or by the description. He inquired whether, in any of the four or six-wheeled English engines, any provision is made

for changing the position of the axles, so as to allow of a divergence from parallelism when rounding curves?

Mr. Bury replied, that in the engines on the Leeds and Manhester Railway, although the axles were placed parallel to each other, a considerable allowance was made in the journals of one pair of the wheels, so as to facilitate the passage round curves.

The President observed, that the wheels being turned conically was of much assistance in passing curves, even although the axles were confined by the journals in a parallel position. He was aware that this threw an extra strain upon the curve rails, but that would only require more attention in securing them than on the straight line of railway.

Mr. Sopwith exhibited a mode of tract of 36 square miles of Gloucestershire, comprising the mining districts in the Forest of Dean. This model shewed all the undulations of the surface, the towns, villages, and detached buildings, railways, coal and iron mines; and, separating vertically through the centre from north to south, and from east and west, exhibited the geological formation down through the coal measures to the old red sandstone: the construction is such that, by lifting off horizontal layers, the extent and position of each bed of coal is shewn, with the extent of the workings in the different collieries; and on each bed is marked the portion that can be worked by level and freed from water by natural drainage. This coal tract forms an elliptical basin; the longest diameter of which, from N. N. E. to S.S.W., is about 10 miles, and the shorter about 6 miles, ranging round Coleford as a centre. There are about 20 beds of coal, of various thickness, containing together nearly 37 feet of clear coal. The carboniferous strata crop out regularly all round against the mountain lime-stone and old red sand-stone, and dip uniformly towards the centre of the basin. This could scarcely be shewn clearly, even by an almost indefinite number of plans, which induced Mr. Sopwith to project the model, the method of constructing which, he described to be by framing together, in squares, a

given number of thin strips of wood, joining them by half lapping at the intersections; on these strips, the profiles of the sections were drawn, from measurements and borings. The compartments of these skeleton frames were then filled in with lime-tree wood, as being lightest and easiest to work, and carved out to the depth of the lines drawn on the strips; by these means a series of horizontal sections, fitting into each other, were obtained, and when painted of the proper colours, both on the surfaces and on the edges, produced the complete model which he exhibited. The cost of it was about £30. complete. It was constructed under Mr. Sopwith's direction, and from surveys made by him for the Government.

April 14, 1840.

The President in the Chair.

"Description of the Steam Ship 'India,' with a table of the proportions of large Steam Ships."

By Lieutenant E. N. Kendall, R. N., Assoc. Inst. C. E.

This vessel was built at Greenock by Messrs. John Scott and Sons, and the engines were constructed by Messrs. Scott, Sinclair, and Co. To render her eligible as a packet ship between London and Calcutta, *via* the Cape of Good Hope, the timbers were lengthened so as to admit of the quarter deck and forecastle being raised 2 feet more than is usual; by which means, a flush deck was formed along the whole length of the vessel, 200 feet by 29 feet, materially adding to the comfort and convenience of the passengers.

The long flat floor, with straight sides and fine ends, adopted in all the best of the Clyde-built ships, for the purpose of attaining a considerable speed with comparatively small power, and uniting with a light draft of water a good capacity for cargo or passengers, has been adhered to, although the established usage on the Clyde, of making the length six times the beam, has

been somewhat exceeded, without impairing the speed, as the voyage from Greenock to London was made in 86 hours, against a strong head wind during a considerable portion of the time.

The rigging is fitted so as to combine lightness with strength, and the facility of making every thing "snug" when steaming against the wind; the spars being so proportioned as to carry a large spread of canvass when running down the trade winds. There are several improvements in the rigging. Two of them are particularly mentioned. 1st. The employment of iron sockets, into which the shrouds, having been tapered, parcelled, and served, are inserted and firmly rivetted. Instead of passing over the mast-head, they are attached by shackles to a series of holes along the edge of a strong wrought-iron plate or cap, which surrounds the mast. This is more secure than the ordinary fastening, as it prevents all chafing or injury from the wet, besides being more compact, and allows any repairs to be more easily effected. 2nd. The mode of fitting the fore-yard, for coming down readily in bad weather. The truss bow is made sufficiently large to admit of the heel of the fore-top-mast passing readily through it, and has on its fore-end an eye through which passes an iron bolt, 5 feet long, which is held in its position by a chain, passing round the mast-head; to the lower end of the bolt is attached a chain, which passes through a swivel eye on the yard, and is drawn tight by a screw traversing one of the deck-beams. When the yard is hoisted up, it slides along the chain jackstay, which prevents it from swaying about, until it reaches the bolt which enters the swivel eye; and when it is closed up, the yard is slung by two short chains, shackled on to the mast-head chains. The operations of striking the yard and top-mast, may be thus accomplished simultaneously, in a few minutes, in the worst weather, or they may be replaced in the same short period.

The engines have most of the acknowledged improvements, and are fitted with "Hall's Condensers," in such a manner, that they can work with them or with the ordinary condensers. The

cylinders are 62 inches in diameter, with 5 feet 9 inches stroke. The diameter of the paddle wheels is 26 feet; the length of the floats is 8 feet, divided into two parts in the depth, and fixed one before and the other behind the arms. There is an apparatus for cutting off the steam at any portion of the stroke. The boilers are of a peculiar construction, combining vertical flues with a series of horizontal fire tubes, exposing a very considerable surface, so as to be worked by slow combustion of the fuel from two sets of fire-places over each other; by throwing on the coals alternately, the gas evolved from the fresh fuel, is ignited in its passage over the other fire-places. A considerable economy has been effected by these means.

The paper is accompanied by a drawing of the improvements in the rigging, with plans of the vessel and engines, and a tabular statement of the proportions and scantling of a number of other large steam ships.

"Description of a Dynanometer, or an Instrument for Measuring the Friction on Roads, Railways, Canals, &c."

By Henry Carr, Grad. Inst. C. E.

The object of Mr. Carr's modification of the dynanometer, is to obviate the irregularity of the common indicator arm, caused by the jerking motion of the tractive power, or any inequality of resistance. The instrument consists of a cylinder half filled with mercury, and containing a piston connected with the spring of the dynanometer, so as to be lowered or raised, as the tractive power is increased or diminished. Two tubes of glass, connected by a passage with a regulating valve, stand in front of the cylinder, one of them communicating freely with it; and in this tube the mercury is raised or lowered proportionally to the power applied; while in the other, an average of the variations is obtained as the facility of communication, between the tubes, is increased or diminished by the opening or closing of the stop-valve. The instrument must be graduated by actual experi-

ment, and the results of the average power may be read off from the scales placed behind the tubes. The paper is illustrated by a detailed drawing of the machine.

"An Account of a proposed Suspension Bridge over the Haslar Lake, at Portsmouth."

By Andrew Burn, Jun., Grad. Inst. C. E.

The usual calculation for the maximum load on each superficial foot of the platforms of suspension bridges is 70 lbs.; but, as in the event of a crowd of persons assembling, the pressure may increase to nearly 100 lbs. per foot; and, by the passage of soldiers marching in regular time, the strain may be greatly augmented,—the projector assumed 200 lbs. per superficial foot as the amount of load to which the platform might be subjected. The peculiar feature of this bridge is the substitution of cast-iron chains for the wrought-iron ones generally used. This deviation from the usual practice, is adopted as a measure of economy, and with a view of increasing their stability and durability, cast-iron being much less influenced by atmospheric action, than wrought-iron. Cast-iron beams, when well proportioned, will bear a very considerable tensile strain. As these chains would be proved beyond the weight they are intended to bear, no doubt is entertained by the author, of their security. The platform, which is formed of transverse iron girders, carrying cast-iron plates $\frac{3}{4}$ of an inch thick, with dovetails falling into holes cast in the girders, is suspended by wrought-iron rods, $1\frac{1}{2}$ inch square, from two lines of chain only, as the strain is more easily brought to bear on them than on a greater number of chains. They are trussed laterally, to prevent oscillation; and the balustrade is so constructed, as to prevent the undulation so prejudicial to suspension bridges generally. To ensure a perfect bearing, each pair of links of the chains, are, in manufacturing, cramped together, and the holes bored out to receive the pins, which are turned to fit them accurately; they are of a larger size than usual, being 4 inches di-

ameter, and a less number are employed. The piers on which the chains pass, are of cast-iron, 33 feet high above the level of the roadway.

	Feet.
The extreme length of the bridge is . .	632
The breadth of the roadway	$17\frac{1}{2}$
The clear waterway between the piers . .	300
The clear headway of the platform above the high water line	$18\frac{1}{2}$
Ditto ditto above low water line .	33

The tension on the chains is calculated as equal to 991.4143 tons. To sustain this tension, the section of the chains is 256 square inches, and taking 7 tons per square inch as the elastic limit of cast-iron, the resistance of the chains will equal 1792 tons, leaving a surplus of 800.6 tons after the calculated strain has been deducted from the real strength of the chains. Three elaborate detailed drawings accompany this paper.

Mr. Smith, of Deanstone, explained a new system of Lockage for Canals, proposed by him, a model of which he presented to the Institution.

To avoid the present expensive construction of locks and their waste of water, the author proposes to divide the canal into a series of basins, the water levels of which should be from 12 to 18 inches above each other. The extremity of each basin is so contracted as to permit only the free passage of a boat; in this is placed a single gate, hinged to a sill across the bottom, the head pointing at a given angle against the stream, and the lateral faces pressing against rabbets in the masonry. The gate is to be constructed of buoyant materials, or made hollow so as to float, and be held up by the pressure of the water in the higher level; on the top is a roller, to facilitate the passage of the boats. When a boat is required to pass from a higher to a lower level, the bow end, which must be armed with an inclined projection, depresses the gate as much as the depth

of the immersion of the boat, and as much water escapes as can pass between its sides and the walls of the contracted parts of the basin. The same action takes place in ascending, except that a certain amount of power must be expended to enable the boat to surmount the difference of level between the basins. The quantity of water wasted by each boat, would be in proportion to its immersion, and the speed at which it passed over the gate. In case of different sized boats passing along the same canal, it is proposed to have a small gate, forming part of the main gate, so as to avoid the loss of water which would ensue from the whole width being open for the passage of a small boat.

This system has only been tried by models; but it is proposed to make an essay, on an extensive canal, next summer, when the results will be communicated to the Institution.

May 5, 1810.

The PRESIDENT in the Chair.

"Description of the Engines on board the Iron Steam Tug, the Alice."
By J. Patrick, Inst. C. E.

The speed of this boat having far exceeded the constructor's expectations, induced the author to send a description of her proportions, and of the construction of the engines. The chief peculiarity in the engines, is their being placed in the centre of the vessel, with the two cylinders in a line with the keel, and placed at an angle of 45 degrees, inclining inwards towards the paddle-shaft, to which the motion is communicated direct, (without the use of side beams,) by long connecting rods, attached to the cross heads, which are placed at the lower ends of the cylinders, instead of being on the top, as in the usual manner; the connecting rods are thus enabled to be three times instead of twice the length of the stroke, as is usually the case. The framing is entirely of wrought-iron, on the tension principle, and

appears to resist the tendency to vibration better than cast-iron framing. For the two cylinders of 31 inches diameter, there is only one air pump of 22½ inches diameter, with 19½ inches length of stroke, instead of the usual complement of two air-pumps, 18 inches diameter each; this is found to be sufficient, as a vacuum of 13¾ lbs. per square inch is maintained. One of the advantages proposed by this mode of construction, is the reduction of weight;—these engines only weighing 9 cwt. per horse power. The small space occupied, leaving more room for passengers, they are peculiarly adapted for river navigation, where the breadth of beam must be limited. The simplicity of their construction renders them less liable to expensive repairs.

The principal proportions of the Alice are:—

	feet.	inches.
Length between perpendiculars . .	95	
Breadth of beam	20	
Draft of water	4	6
Diameter of wheel	14	
Size of engines	two 30 horse power	
Diameter of cylinder	31 inches	
Length of Stroke	3 ft. 3 in.	

The engines were constructed by Messrs. Davenport and Grindrod, of Liverpool. Drawings of the boat and engines accompany this communication.

"Description of an Apparatus for preventing the Explosion of Steam Boilers."

By Robert M'Ewen.

The frequent explosions of steam boilers, caused in many instances by the steam being confined until it acquires a density greater than the boiler can resist, induced the author to invent a simple, self-acting apparatus, intended to warn the engineer whenever the pressure exceeded the proper degree of safety.

The apparatus under consideration, is constructed on the prin-

ciple that steam, in proportion to its density, will support a column of water, or mercury, of a given height, and that any fluid will find the same level in two or more vessels, provided there be a free communication between them. It may be called a mercurial safety valve, and consists of a cylinder, within which are two cups, with two pipes dipping into them, of a length proportioned to the pressure of the steam; these pipes are connected at the top with two valves on one spindle, so arranged, as that when one is open the other must be closed. On the top is a waste steam pipe, open to the atmosphere. One pipe being filled with mercury, and the valve connected with it being open, the mercury remains stationary, until the pressure of the steam exceeds its proper point. It will then be blown out and fall into the empty cup, allowing the steam to escape by the waste pipe, and giving warning to the engineer by its noise. When the pressure is again reduced to its proper point, the valve is reversed, and the mercury will, on the next occasion of an increase of pressure, be blown back again, still giving warning on either side.

Plans and sections of this apparatus accompanied the paper.

[*To be continued.*]

List of Patents

Granted for Scotland subsequent to November 22nd, 1840.

To John Buchanan, of the City of Glasgow, coach-builder, for certain improvements in wheel carriages, whether for common roads or railways.—Sealed 25th November.

James Molyneux, of Preston, linen draper, for an improved mode of dressing flax and tow.—Sealed 26th November.

Samuel Waggstaff Smith, of Leamington, iron-founder, for improvements in apparatus for supplying and consuming gas.—Sealed 26th November.

Frederick Theodore Philippi, of Bellfield Hall, calico printer, for certain improvements in the art of printing cotton, wool, and other woven fabrics.—Sealed 30th November.

New Patents Sealed.

Alexander Dean and Evan Evans, of Birmingham, millwrights, for certain improvements in mills, for reducing grain and other substances to a pulverized state; and in the apparatus for dressing or bolting pulverized substances.— Sealed 8th December.

John Hawley, of Frith-street, Soho, London, watchmaker, (communicated by a foreigner,) for improvements in pianos and harps.—Sealed 9th December.

Frances Molyneux, of Walbrook-buildings, London, for improvements in the manufacture of candles; and in the means of consuming tallow and other substances, for the purpose of light.—Sealed 9th December.

Joseph Leese, Jun., of Manchester, calico printer, for certain improvements in the art of printing calicoes, and other substances. —Sealed 11th December.

Philipe Marie Moindron, of New Ormond-street, London, (communicated by a foreigner,) for improvements in the construction of furnaces, and in boilers.—Sealed 17th December.

John Cartwright, of Loughborough, Leicestershire, manufacturer of hosiery; Henry Warner, of the same place and profession; and Joseph Hayward of the same place, frame-smith; for certain improvements upon machinery commonly called stocking frame, or frame-work knitting machinery.—Sealed 22nd December.

New Patents

SEALED IN ENGLAND.

1840.

To Miles Berry, of the Office for Patents, 66, Chancery-lane, in the county of Middlesex, patent agent, for certain improvements in looms for weaving.—Sealed 27th November—6 months for inrolment.

John Clay, of Cottingham, near Hull, in the county of York, gent., and Frederick Rosenborg, of Sculcoates, in the same county, gent., for improvements in arranging and setting up types for printing.—Sealed 27th November—6 months for inrolment.

John Condie, manager of the Blair Iron Works, Ayr, Scotland, for improvements in applying springs to locomotive, railway, and other carriages.—Sealed 27th November—6 months for inrolment.

George Holworthy Palmer, of Surrey-square, civil engineer, and Charles Perkins, of Mark-lane, merchant, for improved constructions of pistons and valves for retaining and discharging liquids, gases, and steam.—Sealed 28th November—6 months for inrolment.

George Blaxland, of Greenwich, engineer, for an improved mode of propelling ships and vessels at sea, and in navigable waters.—Sealed 28th November—2 months for inrolment.

Henry Bridge Cowell, of Lower-street, St. Mary, Islington, ironmonger, for improvements in taps, to be used for or in the manner of stop-cocks, for the purpose of drawing off and stopping the flow of fluids.—Sealed 2nd December—6 months for inrolment.

James Robinson, of the Old Jury, manufacturer of machinery, for a sugar-cane mill of a new construction, and certain improvements applicable to sugar-cane mills generally; and certain improvements in apparatus for making sugar.—Sealed 2nd December—6 months for inrolment.

Alexander Horatio Simpson, of New Palace-yard, Westminster, gent., for an improved machine or apparatus for working pumps,—being a communication.—Sealed 9th December—6 months for inrolment.

William Peirce, of George-street, Adelphi, gent., for improvements in the preparation of wool, both in the raw

and manufactured state; by means of which the quality will be considerably improved.—Sealed 9th December—6 months for inrolment.

Charles Winterton Baylis, of Birmingham, accounting-house clerk, for an improved metallic pen, to be called "The Patent Flexion Pen," and an improved pen-holder.—Sealed 16th December—6 months for inrolment.

George Wildes, of the city of London, merchant, for improvements in the manufacture of white lead,—being a communication.—Sealed 16th December—6 months for inrolment.

James Davis, of Shoreditch, engineer, for an improved mode of applying heat to certain steam boilers.—Sealed 16th December—6 months for inrolment.

John Steward, of Wolverhampton, Esq., for an improvement in the construction of piano-fortes, harpsichords, and other similar stringed musical instruments.—Sealed 16th December—6 months for inrolment.

James Molyneux, of Preston, for an improved mode of dressing flax and tow.—Sealed 16th December—6 months for inrolment.

Charles Botten, of Farringdon-street, gas engineer, for a certain improvement in gas meters.—Sealed 16th December—6 months for inrolment.

Hugh Graham, of Bridport-place, Hoxton, artisan, for a new mode of preparing designs, and dyeing the materials to be used in the weaving and manufacture of Kidderminster carpets, and for producing patterns thereon, in a manner not before used or applied in the process of weaving and manufacturing such carpets.—Sealed 16th December—6 months for inrolment.

Joseph Beattie, of Portland-place, Wandsworth-road, Lambeth, engineer, for certain improvements in locomotive engines, and in carriages, chairs, and wheels, for use upon

railways; and certain machinery for use in the construction of parts of such inventions.—Sealed 16th December—6 months for inrolment.

Andrew Pruss D'Olszowski, of Ashley-crescent, gent., for a new and improved level for ascertaining the horizon, and the several degrees of inclination,—being a communication.—Sealed 16th December—6 months for inrolment.

William Tudor Mabley, of Wellington-street North, mechanical draftsman, for certain improvements in producing surfaces, to be used for printing, embossing, or impressing.—Sealed 17th December—6 months for inrolment.

Abraham Alexander Lindo, of Finsbury-circus, gent., for improvements to be applied to railways and carriages thereon, to prevent accidents, and to lessen the injurious effects of accidents to passengers, goods, and railway trains.—Sealed 18th December—6 months for inrolment.

Elias Robison Handcock, of Birmingham, Esq., for certain improvements in mechanism applicable to turn tables, for changing the position of carriages upon rail-roads, which improvements are also applicable to castors for furniture and other purpoeses.—Sealed 18th December—6 months for inrolment.

Richard Coles, of Southampton, slater, for improvements in making or manufacturing tanks and other vessels of slate, stone, marble, and other materials, and in fitting and fastening such materials together.—Sealed 23rd December—6 months for inrolment.

Benjamin Baillie, of Henry-street, Middlesex, for improvements in locks, and the fixings and fastenings thereto belonging.—Sealed 23rd December—6 months for inrolment.

John Brumwell Gregson, of Newcastle-upon-Tyne, soda water manufacturer, for improvements in pigments, and in

the preparation of the sulphates of iron and magnesia.—Sealed 23rd December—6 months for inrolment.

Frederick Payne Mackelcan, of Birmingham, and James Murdoch, of Hackney-road, civil engineers, for certain improvements of or belonging to tables, a portion of which is applicable to other articles of furniture,—being partly a communication.—Sealed 23rd December—6 months for inrolment.

George Thornton, of Brighton, civil engineer, for certain improvements applicable to railways, locomotive engines, and carriages.—Sealed 23rd December—6 months for inrolment.

John Dickinson, of Bedford-row, Holborn, Esq., for certain improvements in the manufacture of paper.—Sealed 23rd December—6 months for inrolment.

David Walther, of Angel-court, Throgmorton-street, merchant, for certain improvements in the methods of purifying vegetable and animal oils, fats, and tallows, in order to render those substances more suitable to soap-making, or for burning in lamps, or for other useful purposes; part of which improvements are also applicable to the purifying of the mineral oil or spirit, commonly called "Petroleum or Naptha, or Coal Oil, or Spirit of Coal Tar,"—being a communication.—Sealed 23rd December—6 months for inrolment.

John Jones, of Leeds, brush-manufacturer, for certain improvements in carding engines, for carding wool or other fibrous substances,—being a communication.—Sealed 23rd December—6 months for inrolment.

Joseph Barker, of Regent-street, artist, for improvements in gas meters.—Sealed 23rd December—6 months for inrolment.

CELESTIAL PHENOMENA FOR JANUARY, 1841.

D. H.

1 Clock before the sun, 3m. 59s.

– ☽ rises 11h. 19m. M.

– ☽ passes mer. 6h. 27m. A.

– ☽ sets 0h. 33m. M.

7 51 ☉ in Perigee.

4 11 53 ☿ in conj. with ♄ diff. of dec. 0. 56. S.

5 Clock before the sun, 6m. 15s.

— ☽ rises 2h. 26m. A.

— ☽ passes mer. 11h. 28m. A.

— ☽ sets 7h. 23m. M.

6 Occul 37 Geminorum im. 16h. 28m. em. 17h. 21m.

17 ☽ in Perigee.

7 2 58 Ecliptic oppo. or ○ full moon

9 15 49 ♂ in □ with the ☉

10 Clock before the sun, 7m. 56s.

— ☽ rises 8h. 27m. A.

— ☽ passes mer. 2h. 28m. M.

— ☽ sets 9h. 37m. M.

13 18 35 ♃'s first satt. will im.

14 0 31 ☽ in □ or last quarter

14 1 ♂ in conj. with the ☽ diff. of dec. 7. 27. N.

15 11 56 ☿ in Aphelion.

17 Mercury R.A. 19h. 6m. dec. 23. 51. S.

Venus R. A. 22h. 24m. dec. 9. 19. S.

Mars R. A. 13h. 28m. dec. 6. 58. S.

Vesta R. A. 20h. 50m. dec. 20. 26. S.

Juno R.A. 12h. 23m. dec. 3. 38. S.

Pallas R. A. 20h. 26m. dec. 0. 9. N.

Ceres R. A. 21h. 44m. dec. 21. 42. S.

Jupiter R. A. 16h. 40m. dec. 21. 31. S.

— Saturn R. A. 17h. 50m. dec. 22. 24. S.

— Georg. R. A. 23h. 15m. dec. 5. 35. S.

— Mercury passes mer. 23h. 22m.

— Venus passes mer. 2h. 57m.

— Mars passes mer. 17h. 39m.

— Jupiter passes mer. 20h. 51m.

— Saturn passes mer. 22h. 0m.

23 32 ♃ in conj. with the ☽ diff. of dec. 5. 30. N.

19 7 29 ♄ in conj. with the ☽ diff. of dec. 5. 4. N.

16 ☽ in Apogee.

20 Clock before the sun, 11m. 26s.

— ☽ rises, 7h. 3m. M.

— ☽ passes mer. 10h. 26m. M.

— ☽ sets 1h. 53m. A.

21 7 29 ☿ in conj. with the ☽ diff. of dec. 0. 43. N.

22 ☉ eclipsed, invisible at Greenwich.

5 6 Ecliptic conj. or ● new moon.

24 13 25 ♀ in conj. with Her: diff. of dec. 0. 4. N.

25 Clock before the sun, 12m. 43s.

— ☽ rises 8h. 51m. M.

— ☽ passes mer. 2h. 15m. A.

— ☽ sets 7h. 35m. A.

26 1 52 Her: in conj. with the ☽ diff. of dec. 3. 49. S.

4 58 ♀ in conj. with the ☽ diff. of dec. 3. 56. S.

29 Juno stationary

17 27 ♃'s third satt. will em.

30 Clock before the sun, 13m. 41s.

— ☽ rises 10h. 1m. M.

— ☽ passes mer. 6h. 2m. A.

— ☽ sets 0h. 59m. M.

11 0 ☽ in □ or first quarter.

31 3 22 ☿ in conj. with Pallas diff. of dec 20. 51. S.

J. LEWTHWAITE, Rotherhithe.

THE

JOURNAL AND REPERTORY

OF

Arts, Sciences, and Manufactures.

CONJOINED SERIES.

No. CIX.

Recent Patents.

To William Gossage, *of Stoke Prior, in the county of Worcester, manufacturing chemist, for certain improvements in manufacturing iron.*—[Sealed 18th June, 1838.]

The method of converting pig or crude iron into malleable iron, by first melting the pig or crude iron in a furnace, called a "finery," and separating a considerable portion of the earthy impurities contained in such iron, and afterwards submitting the iron to the process called "puddling," and subsequently to the operation called "shingling," is well known.

It is also known to manufacturers of malleable iron, that during the operation called shingling, as conducted in the above-mentioned method of converting pig or crude iron into malleable iron, a large quantity of black scoria, which is technically called "hammer slag," is separated from the

metallic iron; and that this hammer slag consists of iron, combined with oxygen, and is nearly free from earthy matter.

An improvement upon the above-mentioned method of converting pig or crude iron into malleable iron, has been adopted; which improvement consists in using the hammer slag, obtained as before described, for the purpose of purifying pig or crude iron, and converting such iron into malleable iron, by the operation called puddling, without the previous application of the finery process.

In working, according to this improvement, hammer slag is put into the puddling furnace with pig or crude iron, in the first instance, and the operation of puddling then proceeds, according to a method well known; during which operation, a boiling up or effervescence takes place, and the earthy impurities become fluxed into cinder, which separates from the iron.

After the operation, called puddling, has been completed, the iron, which has been separated, is submitted to the process, called shingling, in the same manner as is practised in working upon the old method, and a black scoria, which is also called hammer slag, is thereby separated from it; which hammer slag consists of iron, combined with oxygen; but it also contains a considerable portion of earthy matters, which render this hammer slag unfit to be used for purifying pig or crude iron in the puddling furnace.

The manufacturer is therefore obliged to continue the finery process in part, in order to obtain hammer slag, of suitable quality, to be used for purifying pig or crude iron, in the puddling furnace, in the first instance.

I consider that the action of the hammer slag, used in the puddling furnace, as herein referred to, consists in furnishing oxygen, which disengages the carbon contained in

the pig or crude iron, and in supplying oxide of iron; which, combining with earthy impurities contained in such pig or crude iron, forms the fusible compound called cinder.

One of the objects of my invention, is to supply a cheap material, to be used as a substitute for hammer slag, in puddling pig or crude iron. For this purpose, I use the common argillaceous iron-stone, which is found generally in the coal districts of this country. This material contains oxide of iron, combined with carbonic acid; and by roasting or calcining it, in the ordinary method, I convert the carbonate of iron which it contains, into oxide of iron, and render the stone capable of being more easily reduced to powder. I then powder the calcined stone; and when this is powdered, it may be applied alone to the pig or crude iron, in the puddling furnaces; but I prefer to mix the powdered stone with lime, in powder, either in the state of quick-lime, or in the state of carbonate of lime.

The quantities of materials I usually employ for 450 pounds of pig or crude iron, of average quality, are 30 pounds of calcined iron-stone, and 5 pounds of slacked lime. I introduce the mixed powder into the puddling furnace at the same time as the pig or crude iron, closing the damper of the furnace to prevent the powdery materials being carried off by the chimney draft. I then conduct the operation of puddling in the same manner as when hammer slag is employed.

As argillaceous iron-stone varies in the proportions of earthy matter, and oxide of iron which it contains, so the quantity of this stone required for purifying a given weight of pig or crude iron, will consequently vary. I find the proportions which I have stated, suitable, when the iron-stone, which I use, contains from 40 to 50 per cent. of oxide of iron; and when this is applied to pig or crude

iron of fair average quality. The proportion of lime required, will vary according to the proportion of earthy matters contained in the pig or crude iron, and iron-stone respectively; but, as it is not customary for manufacturers of iron to investigate, with accuracy, the constitution of the pig or crude iron, or other materials which they employ, the most convenient mode will be to judge of the suitable proportions of iron-stone and lime by the progress of the operations. If the workman finds that the cinder produced does not become sufficiently fluid to separate freely from the malleable iron, he should increase the proportion of lime employed; and if the boiling up or effervescence, which occurs during the puddling, is not sufficient, he should increase the proportion of iron-stone employed. But it will be understood, that these last-mentioned directions are intended to apply only to subsequent operations; and that it will not be necessary, in any instance, to vary the proportions of any of the ingredients employed, after the operation of puddling has been commenced.

My improvements in the manufacture of iron, also consist in the construction of a more durable sole for the furnaces employed in the operation of puddling. In the furnaces usually employed for this purpose, the sole is a plate of cast-iron, which is protected from the action of the fire by hammer slag and iron "scale;" but, instead of a sole of cast-iron, which requires this protection, I use a sole of such grit stone as possesses the quality of resisting the action of fire. The stone which is usually employed for forming the hearths of iron smelting furnaces, is suitable for the above purpose. I make this sole with either one entire block of stone, or with several blocks, fitted together without cement.

I construct the sole in a form similar to that of the

puddling furnaces now in use,—to provide for running off the cinder; and I cause it to be sufficiently dished or hollowed out to retain the cinder, without allowing it to come in contact with the walls of the furnace. I prefer that the sole should not be less than 9 inches thick in any part; and, as the furnaces will be similar to those now in use in all respects, except as above-described, I do not consider it necessary to give any further description of them.

The qualities required in the material used for constructing the furnace sole, according to my improvements, are, a capability of enduring the action of fire, and such compactness and hardness as will best resist the chemical action of the fluxes to which the sole will be exposed in puddling iron, and which qualities are found in the grit stones used for the hearth stones in blast furnaces.

Having now described the nature of my said improvements, and the mode of carrying the same into effect, I claim, as my invention, the use of argillaceous iron-stone in the conversion of pig or crude iron into malleable iron, by the process called puddling, whether this argillaceous iron-stone be used with lime or other fluxing materials, or be used alone. And I claim the use of lime as a fluxing material, when used with any kind of iron-stone, or oxide of iron, in the conversion of pig or crude iron into malleable iron, by the process called puddling. And I claim, lastly,—the use of such kind of stone, as I have herein-described, for constructing the soles of furnaces for puddling iron.—[*Inrolled in the Rolls Chapel Office, December,* 1838.]

To John Patterson Reid, *of the city of Glasgow, merchant, and* Thomas Johnson, *of the city of Glasgow, mechanic, for their invention of certain improvements applicable to certain looms for weaving different sorts of cloth.*—[Sealed 20th March, 1834.]

These improvements are applicable to certain looms for weaving cloth, formly invented and patented by the said Thomas Johnson; which looms were called "Johnson's vertical power looms;" but it is unnecessary to enter into a description of them, as the looms constructed, according to the present improvements, have such different properties from the said Johnson's vertical power looms, as to have very little in common therewith, excepting in the circumstance of the cloth, during its formation, extending in a vertical plane.

The main object of the present improvements, is to enable four webs or pieces of cloth to be woven simultaneously, and at one operation, in the same vertical loom; which loom contains but one lathe or slay, with suitable machinery for moving it alternately upwards and downwards.

Plate XVII., fig. 1, represents a vertical section of the loom designed to weave four webs at one time; the section being taken transversely through the lathe *a*, which is of considerable length and width, and is placed in a horizontal position, with two horizontal reeds *b, b*; both being in the same plane, one extending across the loom at the front side, and the other across at the back.

Each of the reeds is adapted to weave two webs or pieces of cloth from one vertical warp *c, c*; which warp, by means of a division along the reed, and a peculiar and suitable mounting of the heddles, is divided or opened into two distinct sheds; through each of which sheds a shuttle is

thrown, leaving a weft thread in each of the said sheds, suitably for the formation of cloth.

The yarns of the warps of the four webs are to be wound upon two yarn-rollers or beams *d, d,* placed at the bottom part of the loom, and parallel to each other. The yarns which proceed from each of the yarn-beams, are conducted upwards in planes, nearly parallel and vertical, through the heddles, which are extended horizontally, and through the two reeds in the lathe.

The yarns so proceeding from each yarn-beam, are each divided into two series, for weaving two distinct webs or pieces of cloth, by means of two shuttles; for this purpose, the horizontal surface of the dents of each reed is divided by means of a long narrow ruler; which rulers are fixed horizontally across all the dents, extending the whole length of the reed, so that the horizontal surface, which the dents of the reed present, is divided by each ruler into two parallel channels or shuttle-races. Each reed being thus divided into two shuttle-races,—there are in all four shuttle-races for the passage of four shuttles, which are to be thrown at once, by a simultaneous motion, through the several sheds of the warps; which sheds are opened simultaneously for their reception.

One half of the series of yarns, proceeding from each beam, are appropriated to one of the said two channels or shuttle-races, and the other half to the other race; that is to say,—every alternate yarn, proceeding from either yarn-beam, is conducted up through that part of the reed which forms one of the said shuttle-races; and every other intermediate yarn, from the same beam, is conducted up through the other shuttle-race, on the same reed.

The heddles *e, e,* are tied horizontally across the loom, from front to back, beneath both the reeds; and each heddle has two eyes or maillcs in it, at suitable distances

apart, to receive two yarns, one of them belonging to the front yarn-beam and front reed, and the other yarn belonging to the back yarn-beam and back reed; wherefore each heddle operates upon the yarns for two of the four webs, which are to be woven at once; and, by drawing the heddles, with suitable horizontal motions, the yarns for all the four webs are divided, and opened into sheds at the same time.

Whilst the four shuttles are thrown, the lay, with its reeds, remains motionless at the lowest position of its descending motion; but, immediately after the shuttles have made their shoot across through their respective sheds, leaving the four wefts after them, extended along the reeds across the dents, the lathe begins its ascending motion, in order to carry up the wefts within their respective sheds, which are all closed simultaneously by a suitable action of the heddles, whilst the lathe is ascending; and when it reaches the highest position of its ascending motion, the reeds beat all the four wefts forcibly upwards between the closed warp-yarns, in order to form them into cloth.

The cloths, as they are formed, are drawn upwards, and wound round the cloth-beams *f*, *f*, placed above,—one at the back, and the other at the front of the loom, and corresponding to the two yarn-beams, at the bottom of the loom.

The accessaries and new improvements which are proposed to be applied to vertical power looms of this description, for the purpose of weaving four webs at once, in the same loom, are as follows:—

In order to avoid stopping the motion of the loom, when any one of the four weft-threads break, twice or three times as many shuttles, as are required for constant use, are to be lodged in suitable receptacles or shuttle-boxes, which are so arranged, that the breaking of a weft-thread

will cause a change of shuttles, and the substitution of spare shuttles, which have been provided and placed in the said recptacles, ready for such changing. But if, by neglect of the attendant, the loom is not provided with a pair of spare shuttles, it will stop its own motion. The arrangement, by which this is effected, is as follows:—

The shuttle, fig. 2, is provided with a spring detent 1, the end of which, nearest the bobbin 2, is made heavier than the other end; but the heaviest end is kept raised by the tension of the weft-thread, when unbroken; the said thread passes over the pin 3, through an opening at the heaviest end of the detent, over the pins 4 and 5, and then through an opening at the lightest end of the detent, under the pin 6, and out at the eye 7, of the shuttle; thus, on the breaking or failure of the weft-thread, the heavier end of the detent, being no longer upheld, will lie on the bottom of the shuttle, elevating its lighter end above the shuttle.—This end, on the shuttle entering its cell, forces back a projection, which protrudes through an opening in the pecker; and the projection, on being forced back, acts upon a series of levers, which cause the cells, containing this shuttle and its fellows, to move towards the right-hand side of the loom, their places being filled by the two adjoining cells, containing spare shuttles. This operation is repeated on the breaking or failure of a weft-thread, as many times as there are pairs of spare shuttles provided. But if, by the neglect of the attendant in not replenishing the cells with spare shuttles, the whole number have been changed, and another change is required,—then the mechanism for changing the shuttles, having no spare shuttles to effect the change, will, by means of a lever, draw out the connecting pin from the boss, on the main driving shaft *g*, (and which pin connects this shaft with the working parts of the loom,) and thereby suspend the operations of the loom.

In order to cause the loom to stop itself, in case any of the shuttles fail to enter their cells, the top of a lever enters into each cell, and protrudes towards the centre of the cell, when the shuttle is absent; but when the shuttle enters the cell, it presses the lever into an opening in the side of the cell, the said lever being continually urged towards the centre of the cell by its spring. This lever acts upon the levers belonging to the connecting pin before-mentioned, but can only act upon them when the cell is empty; so that when the shuttle fails to reach its cell, this lever will, after the lay has descended, cause the loom to stop.

The arrangement of the heddles, or what is called the mounting of the loom, is so contrived, as to be suitable for weaving four webs of plain cloth at once; but it admits of introducing four or more heddles, independent of the two heddles which are requisite for plain weaving; and the mechanism by which the heddles are drawn, (with a slight alteration,) admits of weaving any kind of twilled cloth, by means of the four or more heddles, which are introduced.

The loom is also provided with substitutes for temples, for the purpose of keeping the four webs of cloth extended in width during the operation of weaving;—they are a sort of pincers *j*, *j*, of which there are four pairs,—two pairs being applied at each selvage or border of the adjacent webs of cloth. The selvages or borders of the two adjacent webs, are between the jaws of one of the pairs of the pincers; so that the jaws being closed, will bite and hold the selvage of the two webs like one;—and when the jaws of the pincers are opened, they will leave the two cloths quite detached, and at liberty.

During the time that the warps are opened into sheds, for the admission of the shuttles, the jaws of all the four pairs of pincers are opened by a suitable spring, with which

each pair is provided; and the pincers, at the opposite selvages of each pair of adjacent webs, are then advanced towards each other, in order to reach over the respective selvages; but, after the four shuttles are thrown, as the sheds of the warp are closing, and whilst the lathe, with the reeds, is moving up towards the cloth, the jaws of all the four pairs of pincers are closed by the wedge-like piece *h*, attached to the rod *i*, which moves the lathe up and down.—This piece *h*, causes the two rollers, shewn by dots, to recede from each other, and so to close the jaws of the pincers, upon the selvage borders of the cloth, as to bite it; and those pincers, which are situated at the opposite selvages of the same webs, are caused to recede from each other, in order to extend the webs of cloth to their intended width, and to hold them firmly at that width, at the moment when the last shoots of weft are beaten up by the reeds. After this, as the lathe descends, the pincers advance towards each other, and their jaws are opened by their springs, as before.

The yarn-beams are loaded with only a small retaining weight, applied in the usual manner, in order that the friction, thereby produced, may occasion but a slight resistance to the rotation of the beams, as the yarns are drawn off by the gradual formation of the cloth; therefore, when the sheds of the warp are opened, the yarn-beams will turn a little, and give off as much of the yarns as will allow them to yield, so that they may divide easily.

A ratchet-wheel is fixed upon one end of each yarn-beam, and two clicks are so connected with the machinery, which carries the lathe up and down,—that, as the lathe is rising, to beat up the weft, and whilst the sheds of the yarns are closing, each of the said clicks will be brought, by the machinery, into the teeth, and will turn the yarn-beam round as much as is necessary to wind up the yarns

to a suitable tension; but, as the lathe descends again, and the yarn requires to be opened into sheds, the said clicks are withdrawn, by the machinery, from the teeth of the ratchet-wheels, leaving them at liberty to yield and give off the yarns.

Each of the cloth-beams gathers up two thicknesses of the cloth together; in consequence of which, the beam will increase in size faster than the cloth-beam in ordinary looms, which winds up only one thickness. The mechanism, for turning the cloth-beam round, adapts itself to this circumstance, so as to take up the cloth at the same rate when the cloth-beams have become larger, by the accumulation of cloth around them, as when they were smaller.—This is effected by the following means:—the cloth-beams are turned by the screws *m*, taking into the teeth of the toothed-wheels *o*, at their ends; which screws receive their motion from a ratchet-wheel *n*, affixed on the same axis; this ratchet-wheel is turned by four clicks, attached to a lever, which has an alternate ascending and descending motion; the motion being regulated by a rest, which rises from a flat ruler, bearing upon the cloth wound upon the cloth-beams, so that, as the cloth-beams increase in diameter, the rest being raised, will limit the descent of the lever above-mentioned, and thus the cloth-beams will be turned with a continually diminishing speed.

By means of other mechanism for changing shuttles, the four webs, which are woven at once, may have cross stripes of different colours of weft-yarns, or of different strength and appearance. For this purpose, the several sets of spare shuttles being charged with different kinds of weft, the changes of the sets of shuttles, in due succession, will occasion like changes in the weft, so as to produce such cross stripes, which may also be combined with longitudinal stripes of different colours, or different strength of

warp-yarns or threads, produced by suitable arrangements of the different colours or sorts of yarns, in the previous operation of arranging; so as, by combining cross stripes and longitudinal stripes, to produce chequered patterns for cloths of the kind called palicates or checks.

The shuttle-boxes or receptacles for the several shuttles, which contain wefts of different colours, or different strength of weft yarn, have as many cells, situate one over another, as is required for the reception of the several sets of shuttles; and the shuttle-boxes are raised or lowered by means of a lever, suspended on the axis *p*, at the top of the loom, the shuttle-boxes being supended one from each end of the lever.—This lever receives its motion from a series of levers, which are actuated by a revolving barrel, placed above the cloth beam, but not shewn in the drawings. This mechanism raises or lowers the shuttle-boxes just as much as is necessary, in order to bring the particular set of shuttles, which are wanted for the time, to a proper level, for pecking them across the reed, through the open sheds of the warp.

The above-described mechanism can be readily altered, so as to operate with different orders of succession, suitable for different patterns; and with a suitable modification of the last-mentioned mechanism, and also with a new kind of mounting of the heddles, adapted for figure-weaving, combined with Jacquard machinery,—the four webs, which are woven at once, may be woven with ornamental patterns, of the nature of what is termed figure-weaving; or in lieu of the said figure-weaving machinery, the patentees apply to this loom a new kind of figure-weaving machinery, which receives the diversification of its actions in drawing the heddles from a pattern-board *r*, the nature of which is more clearly shewn at fig. 3, and upon an enlarged scale.

Upon the flat surface of this pattern-board *r*, the intended

pattern is carved in relief, somewhat in the manner of a block for printing calico, except that the parts of the pattern which are to exhibit different colours, are cut down to different corresponding depths of depression; and which, when placed in its situation at the upper part of the loom, as shewn at *r*, its carved surface is presented beneath the lower extremities of a row of needles or small sliders *s*, which stand side by side close together in vertical positions; and which needles severally, at suitable intervals of time, during the operation of the loom, are all let fall, so that the lower ends come to rest, by their own weight, upon the said carved surface; and by the inequalities of the relief of the carving, some of the needles will be allowed to drop lower than others.—These needles, which are sustained by the more prominent parts of the carving, are acted upon by a straight-edged rule *t*, placed horizontally across all the rows of needles; which straight-edge being brought backward, when required to act, is thereby brought in contact with certain lateral prominences in the needles, so as to push back all those which were prevented from falling; but passing above the lateral prominences of all the lowered needles, thereby leaving those needles undisturbed. Each needle is connected with or tied to a lever *u*, which levers are placed transversely over the loom, their back ends bearing upon a fulcrum. One or more of the heddles are suspended from each of these levers, near to the middle of its length; and all the levers being placed side by side in a row, at the top of the loom, their front ends form a straight row across the loom, until some of them are drawn back with an endway motion upon their fulcrum, by the straight-edge *t*, acting upon their corresponding needles.

The front extremities of these levers, which are not drawn back, are lifted up by the edge of a horizontal

lifting bar *w*, which rises upwards when the sheds of the warp are to be opened; and in rising, they pull up those heddles which depend from them, by which means a selection of warp threads is effected.

By the different depths of carving on the pattern-board *r*, the needles are thus divided into several series, which are acted upon successively by the straight-edge *t*, in order to produce a change in the selection of warp threads.

The pattern-board is fastened upon a moveable table *x*, which is moved, either backwards or forwards, with a slow progressive motion, by the pinion *y*, taking into the rack *z*, attached to the under part of the table.—This pinion receives its motion from two ratchet wheels, fastened on the same axis, and these wheels are turned by drivers.

At each time of the pattern-board moving, the needles are raised and let fall again, so as to come on a different part of the pattern; by which means different needles are selected each time of moving. As soon as the pattern-board has conducted its pattern completely along beneath the needles, the pattern in the cloth being woven, the needles are lifted up, and the pattern-board returns to its first position, with an instantaneous movement; or, when the pattern-board has only half the pattern on it, the other half, being merely a repetition of the first, it returns with the same slow motion that it went forward with.

Instead of the above, the pattern may be carved on the circumference of a cylinder, mounted on a horizontal axis, and turned round with a slow progressive motion; and if the pattern is exactly the size of the cylinder, as soon as it has been once passed under the needles, the cylinder will have regained its first position; but if only half the pattern covers the cylinder, (the other half being a repetition of the first,) then, as soon as it has made one revolution, it returns in an opposite direction, and so on alternately.

To produce a variation in the succession of the changes of shuttles, a portion of the carved surface of the pattern-board, or else a distinct pattern-board, must be provided, and carved with alternate elevations and depressions, for actuating the elbow lever *a*, *a*, and the levers below; which are connected with stop detents, for detaining and determining the positions of the revolving barrel before-mentioned, for effecting the raising or lowering of the shuttle-boxes, in a proper manner; to change the shuttles and produce cross stripes, as the position into which the revolving barrel is turned and detained, previous to every succeeding shoot, determines which of the different colours of weft shall be thrown at that shoot.

The mechanism of the figure-weaving loom will be simpler, if the plain or twilled ground of the cloth is produced by a distinct apparatus.

To effect this purpose, those heddles, which belong to the yarns, that are to form the warp of the plain ground, are united to a few lames or rods, in order that, by drawing up one of those lames, a number of heddles may be raised together with one motion. The lames are to be suspended from horizontal levers at the top of the loom, in a similar manner to the levers *u*, and disposed of in the same row.

It was before stated, that only one or two heddles were suspended from each lever; but by means of the lames, several heddles may be suspended from each of the levers. These levers are provided with needles similar to the others, and which might be actuated by dropping them on a suitable carved part of the surface of the pattern-board. But as that part of such carved pattern would be a continued repetition of a simple series of changes, it will be better to substitute a small cylinder or revolving barrel, the surface of which is carved into a series of suitable prominences and depressions, in order to actuate the needles in a similar manner to the pattern cylinder.

It is added in conclusion, that, whereas cylindrical barrels, studded with projecting pins similar to organ barrels, have been used in figure-weaving machinery,—we make no claim to the invention of such a barrel, except when the same is applied in figure-weaving machinery of the kind herein-before described, with needles, and other necessary parts, suitable for weaving four webs at once, of figure-woven cloth, in the same vertical power loom; and also when the surface thereof is carved with different heights and depth of relief, at all the parts which are to be represented in the cloth with difference of colour.

The improvements claimed are, weaving four webs of cloth at once in the same vertical power loom, by simultaneous action of the various parts thereof, in the manner herein-before described.—The reeds, for beating up the wefts of the four webs, being contained in the same moving frame or lathe, and each reed, being divided into two separate shuttle-races, for weaving two of these four webs, and the heddles, for dividing the warps, being adapted for opening the same into four sheds.

Secondly,—The improvement, herein-described, of mechanism for changing the shuttles, in a vertical power-loom, for weaving four webs at once. When any one weft thread breaks or fails, the said mechanism then substituting spare shuttles, by an instantaneous movement, without any act of the attendant, and without stopping the loom. And whereas, moveable stops have been before applied in shuttles, to come into action, and cause the loom to stop itself, when the weft-thread breaks or fails, we make no claim to the invention of a stop in the shuttle for the purpose of causing the loom to stop itself, when a weft-thread breaks or fails,—but only to the mechanism which is brought into action by such a stop, in order to change the shuttles for others, without stopping the loom.

Thirdly,—The improvement, hereinbefore described, of applying and combining four pairs of moveable pincers, for extending the width of four webs, which are weaving at once in a vertical power loom; and for keeping those four webs extended to their full width, during the action of beating up the weft by the reeds.

And whereas a kind of pincers have been applied to ordinary power looms, which weave one web of cloth at a time, for holding the same to the width at which the reed leaves the web, after having beaten up,—we make no claim to the invention of such pincers, but only to the mode, hereinbefore described, of constructing and applying the pincers to vertical power looms for weaving four webs at once.

Fourthly,—The improvement, hereinbefore described, of mechanism for changing the shuttle-boxes in a vertical power loom, for weaving four webs at once, so as to bring shuttles, containing weft of different colours, (or other difference of appearance,) into action, for the purpose of producing cross stripe, or chequered patterns, in colours or other distinction of appearance; and also for producing the changes of colours, or of appearance, in figure-weaving.

Fifthly,—The improvement, hereinbefore described, of the mode of mounting the heddles, suitable for figure-weaving, in a vertical power loom, for woaving four webs of figure-woven cloth at once.

Sixthly,—The improvement, hereinbefore described, of mechanism for drawing up the heddles, suitably for weaving a figured pattern, in a vertical power loom, for weaving four webs at once; which mechanism derives the diversification of its successive actions on the heddles, from a carved pattern-board, or from carving on the circumference of a revolving cylinder; that carving being a representation of the required pattern in relief, with different stages in the

heights and depths of the relief, at all the parts which are required to be woven with different colours, or other difference of appearance, to be derived from different kinds of weft.—[*Inrolled in the Rolls Chapel Office, September,* 1834.]

To JOHN SHARP, *of the borough of Dundee, in the county of Forfar, North Britain, flax spinner, for his invention of certain machinery for converting ropes into tow; and certain improvements in certain machinery for preparing hemp or flax, for spinning; part of which improvements are also applicable to the preparation of cotton, wool, and silk, for spinning.*—[Sealed 8th October, 1836.]

THE specification of this invention is of very considerable length, much more so than the subject requires, or our limits will conveniently admit; we shall therefore condense this elaborate document, but yet minutely report all the features of the invention, as the late discussion, before the Master of the Rolls, (see page 302 of our present volume,) renders it necessary that the original invention should be fully understood, in order to perceive that the attempted amendment of the specification is not founded upon the original invention; but is, in fact, another and a decidedly different sort of machinery.

That part of the machinery which relates to converting ropes into tow, consists of two revolving cylinders, placed parallel to each other, carrying rows of coarse heckle points, which are to tear the ropes; and straight-edges, designed to force the fibres of the rope into the heckle points, as the cylinders revolve. This machine is shewn in Plate XVIII., fig. 1, being a side elevation.

The rope *a*, to be operated upon, is introduced above, between two rollers *b*, and *c*, which are fluted to receive the rope. The roller *b*, is driven by toothed gear, applied to its axle; the roller *c*, moves merely by friction from its contact,—it being pressed against the former, is made to pinch the rope tightly by means of a weighted lever.

As the roller *b*, revolves slowly, the rope is gradually brought down and suspended between the cylinders *d, d*, which are furnished with rows of heckle points, placed parallel to their axes; and there is affixed, between each row of heckles, on the cylinders, a straight-edge or plate *e*.

The two cylinders *d, d*, are made to turn simultaneously, and in opposite directions, by means of the coupled tooth-wheels *f, f*, upon their axles, one of which is driven by a pulley and band, from any first mover.

As the rope *a*, descends, the heckle points take hold of and tear its surface, separating the fibres, and ultimately reducing the rope into tow, which falls down, with any small pieces not completely reduced, upon the inclined plane *g*, below, and is thence thrown out behind the machine by means of a rapidly revolving spiked cylinder *h*, which is partly enclosed within a casing *i, i*; and in order to introduce the rope effectually to the points of the heckles, the plates or straight-edges *e, e*, coming against the pendant rope, as the cylinders revolve, force it upon the heckle points.

Another modification, of the same kind of machinery, is shewn at fig. 2, which is designed for preparing or heckling flax and hemp, previously to spinning. The strick of flax *a*, is placed in a suitable holder *b*, at the upper part of the machine, the holder being attached to a sliding frame *c*, which is raised and lowered by a cord or chain, passed over a pulley above, and connected to a lever *x*, below.—This lever *x*, is acted upon by a heart-cam *y*, upon the axle of

one of the pair of elliptical wheels *x, x*, driven by gear, connected with the rotary heckler cylinders *d, d*; and hence, as the heart-cam revolves, the holder, with the strick of flax, will be made to ascend and descend, so as to be acted upon throughout the whole length of the strick, by the rotary heckler, (in this instance having very fine points,) in the same way as described in reference to the previous machine; the only addition to which is, that moveable plates or straight-edges, are placed between the rows of heckle points, for the purpose of sliding outwards, and discharging the tow from the heckle points, as they revolve.

A peculiar construction of holder, in which two stricks of flax is to be placed, is shewn at fig, 3, consisting of two plates *a, a*; between which the two stricks of flax are to be spread out and made secure by a screw-bolt, in the middle, between the two stricks; and, in order to prevent the fibres of the flax being drawn out of the holders, a flexible tube of India-rubber, containing water, or any other suitable elastic material, is to be placed in a recess within the plates of the holder.

The machine, shewn at fig. 4, is for rubbing the fibres of flax or hemp, in order to soften them previously to spinning.—These plates of metal *a, b, c*, are applied face to face.—Through apertures in these plates, the fibres of the flax are to be passed, in order to be rubbed. The two outer plates are held in stationary positions, and pressed laterally by springs at their backs;—the middle plate is slidden up and down by means of a crank-rod *d*.

The slider *b*, is represented detached, at fig. 5, shewing the oblong hole or slot through it. The hemp or flax is conducted through the machine, by means of two pairs of of rollers *e, e*; and the plate *b*, being put in motion, the fibres will be submitted to considerable friction, and thereby become softened.

Another machine, for softening hemp and flax, is represented, in an end elevation, at fig. 6.—It is intended to operate by means of two fluted rollers *a*, and *b*, revolving together, and pressed into contact by pendant weights *c*.

Before the hemp or flax is submitted to these fluted rollers, it is to be slightly twisted into a cord or band, which may be done by the aid of the machine, shewn at fig. 7.

The flax or hemp being spread out upon the feeding-table *a*, in fig. 7, is then passed between a pair of rollers *b*; and as it comes out on the other side, is to be slightly twisted by hand. The band of flax is then to be conducted between the fluted rollers of the former machine, fig. 6; and its two ends being united upon the periphery of one of the rollers, it is to be worked round and round between them, in an endless band, until its fibres are sufficiently bruised to cause them to separate readily.

For making compound slivers of flax or hemp, of any required length, breadth, and substance, by several thicknesses, laid on in successive laps from the carding-engine, the machine, shewn at fig. 8, is proposed; which is to be appended to the delivery end of the engine, and to receive the sliver as it descends.

From the carding engine, the sliver passes down to the conducting roller *a*, and is from thence led off to either of the lap-rollers *b*, or *c*; to each of which, the end of a long cloth or web is connected.—One of these lap-rollers (*b*, or *c*,) being thrown into gear, with the driving mechanism, by means of a clutch, will cause the sliver to be wound upon the lap-roller, with a thickness of the web between each layer or sliver, whilst the other lap-roller gives off the length of web.

When the whole length of web, with one thickness of sliver, has been rolled on to one of the lap-rollers, (say on to

b,) the clutch is to be changed, and the driving power applied to the other lap-roller *c*; by which means, the web, with the thickness of sliver upon it, will now wind off the roller *b*, on to the other lap-roller *c*, and, in so doing, will take up a second thickness of sliver, delivered, as before, from the carding engine, and wind it in with the previously deposited sliver.

In this manner, any number of layers of sliver may be lapped together within the web, the reciprocating movements of the machinery causing the successive laps of sliver to be deposited in the way shewn,—a convenient means of actuating the machinery, being obvious to any mechanic.

When a sufficient number of thicknesses of the sliver have been thus lapped, the full roller is to be removed and placed in such an apparatus as will allow of the web being unwound, and the lapped sliver wound off on to one roller, whilst the web is wound upon another roller.

The patentee proposes to form the web, within which the sliver is to be wound, of thin gauze, and to fill up the interstices, between the threads or meshes of such gauze, with paper pulp, by passing it through a paper-making machine; by which preparation, the web will have the smoothness of paper, with the tenacity of cloth.

Some other modifications, of the apparatus for combing or carding tow, are also proposed, as that shewn in fig. 9, which is for equalizing the feeding of tow to a carding-engine.—This machine partakes, in some measure, of the same construction as that shewn and described before, at fig. 1. The tow is placed upon the feeding-cloth *a*, and is thence received between the rollers *b*, *c*, which are covered with spikes, set obliquely, and have clearing bushes behind them. The tow, held by the teeth of these rollers, is drawn off by the heckle-points of the cylinders *d*, *d*, below, in the same way as before described.

This apparatus is intended to be placed at a considerable height, over the feeding-cloth of a carding-engine; and the tow, being let fall from the heckle cylinders, distributes itself upon the feeding-cloth below, which is enclosed within a casing, not shewn. The tow thus deposited upon the endless feeding-cloth, is carried into the carding-engine, and from it a more uniform thickness of sliver is produced.

It is further proposed, to place a few rails, with heckle-points, in contact with the cylinder of the carding-engine, for the purpose of arranging the fibres of the tow in straight lengths; and these heckle-rails may be adjusted, as to their distances from the cylinder, by bearing screws. It is also proposed to untwist old ropes, either by machinery or hand, for converting them into tow.

Such of these machines as are proposed to be employed for preparing hemp and flax, for spinning, are also claimed for preparing, in like manner, cotton, wool, and silk.

The particular features of the machinery, claimed by the patentee, are firstly,—the combination for converting ropes into tow; secondly,—the rubbing apparatus for softening the fibres of the flax and hemp; thirdly,—the contrivance for separating the fibres, by passing them round fluted rollers; fourthly,—the mode of lapping several thicknesses of sliver within a web; fifthly,—the two revolving drums or heckling cylinders, with their ledges or straight-edges adapted; and the mode of lowering and raising the stricks of flax, by a heart or cam-motion; sixthly,—the construction of the holders for suspending the stricks of flax, as described; seventhly,—the combination of machinery for equalizing the feeding of carding-engines; eighthly,—the adaptation of the heckle-rails to a carding-engine; and ninthly,—untwisting and separating the coils of ropes, in order to work them into tow.—[*Inrolled in the Rolls Chapel Office, April,* 1837.]

Subsequently to the inrolment of this specification, the patentee has, under the late Act of Parliament, entered upon the Roll of Chancery a Memorandum of Alterations; which alterations being *additions* to the original invention, and thereby *extending* the patent-right, contrary to the Act, have been the subject of legal discussion, reported in our present volume, at page 302.—The following is the memorandum upon the Roll:—

MEMORANDUM OF ALTERATIONS *entered by* JOHN SHARP, *of the Burgh of Dundee, in the county of Forfar, in Scotland, flax spinner, with the Clerk of the Patents, in England, pursuant to an act passed in the fifth and sixth years of His late Majesty's reign, intituled "An Act to amend the Law touching Letters Patent for Inventions."*

IN the machine for converting ropes into tow, described under the first head of my specification, and in the heckling machine, described under the fifth head thereof, in place of making the cylinders of the dimensions in the drawings, I sometimes make each of them about three feet in diameter, and furnish each cylinder with two double plates and two heckles; each of which double plates takes in a heckle between it as the cylinders revolve; and from the distance that the heckles are placed from each other, upon their respective cylinders, the one heckle quits the extremity of the hemp or flax, before the heckle on the opposite cylinder is pressed into it, by its double plate on the cylinder corresponding thereto. I sometimes also make the two cylinders recede from each other, before putting the strick of hemp or flax between them to be heckled. I place the griper or holder, containing the hemp or flax, so as that the heckles, when the cylinders are brought

together again, shall be just clear of it, in place of making it descend slowly, as specified; and then I make the two cylinders approach each other slowly. The manner in which I make the two cylinders recede from and approach each other, is by placing the axles of the respective cylinders into bushes or bearings, which are fixed upon the tops of upright arms, of about three feet in length.—These are moveable upon centres, at their lower extremities, and move backward and forward about an inch, in slides, on the main framing, close to the said bearings or bushes.

The two wheels, that drive the cylinders, have their teeth long enough to keep them in gear, when the cylinders are separated; each pair of upright arms has a spring between them, which separates the one cylinder from the other. After the separation, a strick of hemp or flax is introduced, and they are brought slowly together by cranks or cams, pressed against the upright arms, and moved by the excentric wheels.

The plates formerly specified, for clearing the heckles from the tow, are kept circulating on each cylinder, about an inch clear of those on the opposite cylinder, by working into grooved guides, fixed to the main framing. When the cylinders recede from each other, the points of the heckles retreat within these plates, and they advance slowly through them, and into the hemp or flax, as the excentrics push the two cylinders together, and thus take a small hold of it at a time.

* In place of two cylinders, with plates and heckles fixed upon them, I sometimes fix the heckles and plates upon bars of metal, which are fixed to belts of leather or chains, and cause these to revolve into oblong vertical curved

* This is the description of Wordsworth's patent, granted in May, 1838, several months prior to entering this Memorandum of Alterations. See Vol. XVI., p. 264, of our present Conjoined Series.

grooved guides, of a length fully equal to the stricks of hemp or flax to be heckled; the said bars being driven by pullies or wheels, with projections, which pitch between the bars or into the links of the chain, and the oblong vertical grooved curved guides, recede from and approach each other, with the heckles circulating on them, as above-described, without the aid of the upright arms; for, as the driving wheels are placed at the lower centres of the guides, the axes of the wheels are kept, by their bushes, in the same place, and the groove guides move around them, upon bearings concentric thereto. And in order to clear the heckles effectually from the tow, when this arrangement is adopted, I use two doffers, covered with card covering, and a comb and crank, to clear each of them, as is well understood, and need not therefore be explained; or else I use two cylindrical gills, the bars of which, with the gill pins, are drawn inwards, by their fixed guides, where they are not near the heckles, and thus clear themselves of the tow they have taken from the heckles. The doffers, or the gills, I place near the bottom of the oblong curved grooved grinder, above-described. I also sometimes make the plates of the griper, specified, much broader,—say about nine inches; and in place of one elastic tube, with fluid, I then use two of them, one at each edge of the plate; and in place of plates of metal, I sometimes use boards of wood. I also use these elastic tubes, filled with fluid, in place of padding or covering for the rollers of drawing frames and cards; and in the method of untwisting ropes, so as to separate them into strands and yarns, described under the ninth head of my specification, instead of adopting the method thereby described, I sometimes effect that object by separating the strands a little with the hand, and then fixing each of them to the hooks of a machine, similar to that used by rope-makers, for laying rope, or in any other suitable manner; and

the machine being then set in motion, in a direction contrary to that by which the rope was laid, the same will be untwisted, and the strands separated. As witness my hand, this tenth day of September, one thousand eight-hundred and thirty-eight years,—JOHN SHARP.

To LOUIS QUANTIN, *of No.* 218, *Regent-street, in the county of Middlesex, carriage-builder, for certain improvements in the construction of carriages.*—[Sealed 20th June, 1834.]

THE first of these improvements, is an improved mode of making the arms of axletrees; its object being to keep the arms well oiled during the progress of the carriage, and to prevent accidents, arising from the nave catching fire by friction.

There are two reservoirs for oil; one is formed in the box, at the collar of the arm; the other is a cap, which screws into the box at the end of the arm.—These reservoirs communicate with each other, by means of four canals or grooves, of two different forms, formed in the arm, and extending from one reservoir to the other. The oil is poured into the cap, through a hole, which is closed by a screw; from thence it is driven along the canals, by the motion of the carriage, to the other reservoir, until that is filled; then the oil being compressed, begins to return, and contrives to proceed backwards and forwards, as long as the carriage is in motion, keeping the arm of the axle well lubricated.

The second improvement, is a new mode of retarding coach-wheels, when going down hill, or for stopping horses when running away; it being so contrived, that the more

strength the horses exert, the greater power is obtained to retard them.

A bar of wood, forming a roller, is attached to the coachman's box, the handle being turned by the coachman. A rope or chain descends from this roller to the bottom of the coach, where it passes round a pulley, and is attached to two other chains, one of which is fastened to one end of a horizontal bar; the other passes round a pulley, affixed to the same bar, near its centre, and thence to an eye or hook, at the end of an iron rod, which slides upon the pole of the coach; the other end having a large hook, to which the "fore horses" are attached. The other end of the horizontal bar, above-mentioned, works on a pivot, affixed to the perch of the coach; to the centre of this horizontal bar, is attached a pulley, round which a chain passes, that is fastened to the bar of the brake, which is kept from the wheels by springs, when travelling on level ground.

The iron rod, which slides on the pole, embraces it by three rings; the one nearest the coach is kept in contact with two iron plates, (attached to the pole,) by a spring, as well as by the pulling of the "fore horses."

When the coachman wishes to retard the progress of the coach, he turns the handle of the roller, and thus forces the brake against the hind wheels; and, by the same action, the iron bar is drawn back as far as its spring will allow; so that when the leaders exert their strength to pull the coach, they draw the brake with greater force against the wheels, and so retard the progress of the same.

The third improvement, is another mode of retarding coach-wheels, the mechanism of which is the same as the preceding one, with the exception of the roller, attached to the coach-box; in place of which, a tread-wheel is placed on the foot-board of the coach-box, having four treads placed on a horizontal axis; round which axis, the rope

or chain is passed, that was before attached to the roller. In order to apply the brake to the wheels, the coachman works the treads with his foot, assisting himself by a lever, attached to the said axis.

The fourth of these improvements, is an improved mode of constructing carriages, which will be lighter and stronger than European carriages.—These carriages are formed partly of European and partly of foreign wood, such as stinking wood, black wood, &c. With respect to the iron-work, it is applied in the least perceptible manner, and in those parts where the carriage suffers most from straining.

The patentee does not particularize the parts to which he applies the iron-work, or the foreign wood, but merely expresses his intention of applying this improvement to all kinds of carriages.

The fifth of these improvements, is a mode of releasing a horse from the shafts of a four-wheeled carriage, when running away.—A rein extends from the body of the carriage to the level of the shafts, where it divides into two, each rein taking a spring, to which the iron-work, that holds the trace, is affixed,—the end entering the shaft. When the spring is pulled back by the rein, the trace is allowed to pass freely, by means of a roller.

The back-band is provided with two spring-hooks, one at each end, each hook holding a pulley, that supports the noose of the shaft-bearer; the belly-band likewise passes over one of these pullies. To each hook is attached a rein, proceeding from the above-mentioned reins; and on these hooks being drawn back by the reins, they open and release the pullies of the shaft-bearers, and the belly-band;—the horse is then free.

The sixth improvement, consists of a carriage, which the patentee calls the "Precaution," being for the defence of soldiers in the colonies. It is entirely musket-proof; is

surrounded by a row of pikes, which can be raised or lowered by chains from the inside; and is provided with loop-holes, through which the soldiers can watch and fire. The bottom of it is surrounded with a vallance, which rises over any inequalities of the road, and serves to protect the feet of the soldiers. This carriage travels on four wheels, and is drawn by the soldiers within, by means of straps passing over their shoulders.

When this is required to travel by post, the patentee adds a pole, with its appendages, to attach the horses to, seats being placed within for the soldiers. The patentee likewise proposes to make a camp bed in it, so as to form a portable guard-house, to be taken to those places where a disturbance is apprehended.

The seventh and last part of the invention is described as an improvement on locomotive carriages. The moving power in this improvement, is the weight of the goods carried. The goods are contained in a number of cylinders, which are placed on the circumference of two large wheels; which wheels are placed in two carriages, the forward one running on four wheels, and the hinder one on two wheels. The motion is communicated from the large wheels to the running wheels by suitable gearing, the large wheels being moved by the descending weight of the cylinders on one side, which, according to the patentee, raise the cylinders on the other side, and so turn the large wheel.—[*Inrolled in the Inrolment Office, December,* 1834.]

To David Redmund, *of Charles-street, City Road, in the parish of St. Luke's, in the county of Middlesex, engineer, for certain improvements in steam-carriages; which improvements are applicable to other purposes.*— [Sealed 28th October, 1833.]

This invention consists of improvements in furnaces for steam-boilers; also improvements in the construction of steam-boilers, and in the construction of wheels for steam-carriages.

The improved furnace is a rectangular hollow box of cast-iron; the exterior sides of which are square with the top and bottom; but the interior sides incline inwards, from the bottom to the top. One of the sides is divided from the others by partitions, and projects out from the furnace, in order to receive the air-trunk.

The fire-bars are of a pentagonal hollow form; the two upper sides of which are at a much more acute angle to each other than any of the other sides. They are supported by bearing bars, attached to the furnace, and are kept apart from each other by small knobs, at each end, which leave a space of three-eighths of an inch between each fire-bar, for the ashes to fall through.

The bottom of the furnace is composed of a perforated plate of iron, the openings in which are closed by perforated sliders, in order to prevent the escape of air at the bottom; but when, in order to discharge the ashes, the sliders are drawn out to a certain distance, the openings in them correspond with those in the bottom plate, and so allow the ashes to fall through.

A stream of cold air passes from the air-trunk into the hollow fire-bars, through suitable openings in that side of the furnace corresponding with the ends of the fire-bars.

Then that part of the air which does not pass through the openings in the upper sides of the fire-bars, to support combustion, passes into the opposite side of the furnace; from whence it proceeds through the other sides, back to the side where it first entered, and there passes out through proper openings, provided for that purpose.

The object of this improvement, is to preserve the fire-bars from destruction by the heat, by passing a stream of cold air through them.

Fig. 1, Plate XIX., is a plan of the furnace. Fig. 2, is an end view. Fig. 3, a section. Fig. 4, an end view of one of the fire-bars. Fig. 5, a section of the same. Fig. 6, is the perforated bottom plate. Fig. 7, one of the sliders.

The same letters of reference are used for similar parts in all the above-mentioned figures. *a, a, a*, are the sides of the furnace; *b*, is the side which projects to receive the air-trunk; *c, c, c*, are the fire-bars, with openings *d*, in them, for the air to pass through, to support combustion; *e*, is the perforated bottom plate; *f, f, f*, are the perforated sliders; and *g, g, g*, are the bearing bars, which support the fire-bars.

The patentee claims, under this improvement, the furnace, as above-described.

The improvements, in the construction of steam-boilers, apply to that boiler for which a patent was before obtained by the present patentee.—In which former patent, the boiler was described as consisting of separate chambers; the sides of which were formed of copper, or other metal plates, bent up into a series of nearly semi-cylindrical fluting or arches; which, corresponding with the similar arches of contiguous chambers, form the fire-flues, and become the principal heating surface of the boiler.—These arches were rivetted to top and bottom pieces of copper; but the patentee finds it more advantageous to construct

the arches, as well as the top and bottom pieces, of malleable cast-iron,—the castings being made of equal parts of white and grey Lorne pig iron. The castings are then placed in an iron box, filled with calcined and pulverized red hæmatite iron ore, and placed in an annealing oven, where they are submitted to a white heat, for one hundred and forty hours.

The patentee claims the improvements in the boiler, as above-described.

The third part of this invention, is improvements in the construction of wheels, for steam-carriages. The wheels are formed of malleable cast-iron, and the castings are exposed to a bright red or annealing heat, for eighty-four hours. The form of the wheel will be best understood by reference to the drawings. Fig. 8, is a front view of the wheel. Fig. 9, is a section of the nave, with part of the spokes and axletree. Fig. 10, is the loose flange. Fig. 11, is a front view of the nave. Fig. 12, shews the mode of filleting the spokes. *a*, are the spokes, which are cylindrical tubes, and are made perfectly straight, where great strength is required; but, where strength is not so much an object, they are formed as shewn in the drawing; by which form, a slight degree of elasticity is obtained, to obviate the concussions arising from rough roads, &c.

The lower ends of the spokes are provided with a shoulder *b*, which rests on a boss *c*, formed in the felloes *d*; into which boss, the extreme end of the spoke is received. The upper ends of the spokes are enclosed between the loose flange *e*, and the fixed flange *f*, on the nave *g*; and, in order to keep the upper ends more secure between the flanges, they may be filleted, as shewn in fig. 12. They are likewise prevented from turning, by a steady pin.

Into the oil-chamber *h*, the oil is conveyed through the pipe *i*; which pipe extends down the inside of one

of the spokes, and the oil is poured into it through a screw-hole at its end; or, when the spokes are made straight, any convenient opening may be made, to introduce the oil into the chamber *h*. *j*, is the cap; *k*, is the box, which is driven tight into the nave; and the inner end of the nave is elongated, in order to provide the space *l*, for a chain-wheel to be placed, in order to move the travelling-wheel; *m*, is the arm of the axletree, which is secured, at its outer end, by the nut *n*; and the wearing surface of the arm is kept well lubricated by the oil *o*, from the oil-chamber.

The felloes *n*, are cast in segments, and are secured, at their heading-joints, by nuts and screws; and are likewise firmly held in their places by the inner rim or tire *p*, which is shrunk on them. The outer or wearing tire *q*, is likewise cast in segments, and is held by screws passing through the inner tire and felloes, their ends being secured by the nuts *r*. A space is left between each segment, in putting them on, in order to allow for the expansion of the metal, by wear.

The patentee claims the construction of the wheel, as above-described; but he lays no claim to any of the parts, herein-mentioned, which have been before in common use, except when combined, as herein-described.—[*Inrolled in the Inrolment Office, April,* 1834.]

To JAMES WALTON, *of Sowerby Bridge, in the county of York, cloth dresser, for his invention of improvements in cards for carding wool, cotton, silk, and other fibrous substances; and for raising the pile of woollen and other cloths.*—[Sealed 27th March, 1834.]

THIS invention consists of the application and adaptation of caoutchouc or india-rubber, instead of the sheets or fil-

lets of leather now used in the manufacture of cards; by which means a greater degree of elasticity is obtained, and the cards are rendered more durable.

Fig. 1, Plate XVIII., shows the mode of applying this invention. *a*, is the india-rubber, into which the dents or teeth *b*, are inserted; and the distance between the dents are found to be better preserved, by cementing a piece of brown holland *c*, at the back of the india-rubber.

Fig. 2, shows the brown holland, applied between two sheets of india-rubber.

The patentee claims the application and adaptation of caoutchouc or india-rubber, as the fillet, sheet, or medium, into which the dents or teeth are set together, in the manufacture of cards, whereby a greater elasticity and durability is obtained.—[*Inrolled in the Inrolment Office, September*, 1834.]

To GEORGE HOLWORTHY PALMER, *of Surrey-square, Old Kent-road, civil engineer, for improvements in paddle-wheels, for propelling ships, boats, and other vessels, navigated by steam, or other motive power.*—[Sealed 23rd April, 1839.]

THIS invention is described, by the patentee, in the following manner, reference being had to Plate XIX., in which fig. 1, shews a transverse section of part of a boat or other vessel v, v, which is intended to be propelled by means of steam or other motive power; and a longitudinal section of an air-chamber x, x, in which is exhibited a front elevation of my improved paddle-wheel or propeller, with all the paddles removed, except two; the timbers z, z, being intended to protect the paddles from injury. Fig. 2, is an

end view of the same paddle-wheel, and a transverse section of the same chamber or air vessel. Fig. 3, is a front view of the strap which supports one end of the axis of the paddle-wheel. Fig. 4, is a plan of a paddle and its shaft, shewing the mode of strengthening the paddles. Fig. 5, is a front view of one of the arms, which connects the paddle-shaft with the guide-wheel A, A, fig. 1; and A, fig. 2, is the axis of the paddle-wheel, being the main driving-shaft; to which motion may be communicated at the end *a*, fig. 1, either by means of a crank, suitable wheel-gearing, or otherwise, as may be determined, to turn the paddle-wheel upon its axis, for the purpose of propelling the vessel in which it is fixed.

B, figs. 1 and 2, is the shaft or axis of the guide-wheel, which must be permanently fixed and firmly secured to a suitable framing or standard, as shewn at *b*, fig. 1, or in some other proper manner, so as to be capable of supporting the guide-wheel, and also one end of the main driving-shaft, with which it is connected by a metal strap.

The shafts A, A, and B, must be placed level, and ranged so as to be parallel with each other. C, C, figs. 1 and 3, is an iron strap, one end of which is to be firmly fixed and secured upon one end of the shaft B, and the other or opposite end of which strap is to receive and support one end of the main driving-shaft A, A, in which it is to revolve. The centre of the shaft A, A, may be placed at such a distance from the centre of the shaft B, as may be thought most expedient, but which, in practice, will be found most convenient when varying from about one half to the whole width of the paddle.

The end *a*, of the revolving-shaft A, A, is to be properly supported at *s*, *s*; and in fig. 1, is represented as working in a stuffing-box *y*, *y*, which may be used when the paddle-wheel is placed in an air-chamber. D, D, and E, E, fig. 1,

are wheels or frames, furnished with radial arms *r, r, r, r*, fig. 2, terminating in a centre or boss, and firmly secured upon the shaft A, A. Upon the fixed shaft B, is fitted a guide-wheel F, F, figs. 1 and 2, of the same diameter as the wheels D, D, and E, E; which guide-wheel is made so as to revolve freely on the fixed shaft B, between the strap C, C, and the collar J, fig. 1, which is keyed to the shaft B. When the key, which fixes the collar J, is removed, the collar J, will slide back from the guide-wheel F, F, and the guide-wheel may then be drawn back from the paddle-wheel, until the pins K, K, fig. 1, are liberated.

In the guide-wheel are made round holes or bushes, to receive the pin K, fig. 1, placed at one end of the arm *i, i*, fig. 1, of each paddle-shaft. G, G, and G, G, fig. 1, are two of the paddles, which are secured to their respective axes *g, g*, and *g, g*, fig. 1, and are supported by the wheels or frames D, D, and E, E. To one end of the axes *g, g*, of each paddle, is fixed an arm *i, i*, fig. 1, furnished with a pin K, figs. 1 and 5, which passes through one of the said round holes or bushes in the guide-wheel.

The distance from the centre of the axis *g, g*, of each paddle, to the centre of the pin K, must be precisely the same as the distance from the centre of the shaft A, A, to the centre of the shaft B. It is not necessary that the centre of any paddle should be the centre of the paddle-shaft to which it is attached; although the best practical result will, in my opinion, be produced when the centre of the paddle and the paddle-shaft are the same.

To the opposite end of the axis of each paddle, is fixed an arm *l, l*, figs. 1 and 2, of precisely the same dimensions as the arm *i, i*, and furnished with a pin *m*, figs. 1 and 2, similar to the pin K. H, H, figs. 1 and 2, is a guide-frame, in which there are holes or bushes to receive the pins *m, m, m, m*, upon which the frame is suspended and works.

Figs. 1 and 2, are intended to represent a paddle-wheel, with four paddles only; but any other number may be adopted, according to the diameter of the paddle-wheel, and its intended velocity. But, when the paddle-wheel is to work in an air-chamber, it ought to be of smaller dimensions than if placed at the side of the vessel; and four or five paddles will generally be found to be sufficient when the paddle-wheel is placed in an air-chamber.

The distance from the centre of the shaft B, to the centre of the driving-shaft A, A, is (as before stated) exactly the same as from the centre of each paddle-shaft *g*, *g*, to the centre of the pin K; and also the same as the distance from the centre of each paddle-shaft *g*, *g*, to the centre of the pin *m*; and the distance from the centre of the shaft A, A, to the centre of the paddle-shaft *g*, *g*, exactly corresponds with, and are the same distance as from the centre of the fixed shaft B, to the centre of the pin K; therefore the several points *i*, *i*, *i*, *i*, *k*, *k*, *l*, *l*, *l*, *l*, and *m*, *m*, *m*, *m*, move through equal distances in the same periods of time, and thereby compel each paddle G, G, to maintain the perpendicular position in every part of the paddle-wheels' rotation. Thus, when the motive power is applied to the shaft A, A, so as to cause it to revolve, the shaft, in whichever direction it may revolve, carries round with it the wheels D, D, and E, E, together with the paddles. The circular motion of the paddle-wheel is, by means of the arms attached to the paddles, communicated to the guide-wheel, which moves round upon its own axis, and completes one revolution during the same time that the paddle-wheel completes a revolution, and thus keeps the paddles in the perpendicular position.

The guide-frame H, H, is intended to equalize the pressure upon each paddle, between the arm *i*, *i*, and the arm *l*, *l*. The guide-frame also performs another important

office, namely, that of keeping each paddle in the same position as the others, when the guide-wheel F, F, is drawn back, and the pins K, K, liberated.

The paddles may be thrown out of action whenever sails are intended to be substituted for steam power, or for any other purpose. The mode of throwing the paddles out of action, is effected as follows:—

The key, which fixes the collar J, being removed, slide back the collar J, from the guide-wheel F, F, and then draw the guide-wheel back from the paddle-wheel, until the pins K, K, fig. 1, are liberated, and perfectly free from the guide-wheel; when the action of the water upon the paddles (if the boat be in motion) will instantly "feather" the paddles, that is, cause them to move in a horizontal instead of a perpendicular position; in which position they may be secured, or may be left to drag on or in the water, and they will then offer very little resistance to the progress of the boat or other vessel, through the water.

The guide-frame keeps the arms *l*, *l*, and *l*, *l*, fig. 1, and consequently the arms *i*, *i*, and *i*, *i*, fig. 1, in the same relative position; and when it is intended again to connect the paddles with the guide-wheel, it will be only necessary to bring one of the pins K, K, opposite to one of the holes or bushes in the guide-wheel F, F, when it will be found that the other pins K, K, will also be opposite to their respective holes or bushes in the guide-wheel; and the guide-wheel may then be easily pushed towards the paddle-wheel, and each of the pins K, K, will return into their proper holes or bushes in the guide-wheel; the collar J, must then be replaced, and the key inserted as before, when the paddles will be again ready for action.

Should the paddle-wheel be applied within an air-chamber, as represented in figs. 1 and 2,—in that case, the water will rise in the chamber level with the boat's draft of water

during the shifting of the paddle-boards; but the water may, in a few minutes, be again displaced and kept at a proper level, by a suitable blowing apparatus or air-pump, communicating with the air-chamber through a tube or pipe, as shewn at L, fig. 1. The level of the water, in the air-chamber, may be known at all times on inspection, by the use of a glass guage or inverted syphon, with a graduated scale attached thereto;—the tube of the syphon being charged with water, quicksilver, or other fluid, and connected with the air-chamber, as shewn at M, fig. 1.

Fig. 3, is a front view of the strap C, C, which connects the shaft A, A, with the shaft B. Fig. 4, is a plan or edge view of a paddle and its shaft, in a detached form, shewing a mode of strengthening the same by the application of two wrought-iron bars *n*, *n*, and *o*, *o*, screwed at each end to the shoulders of the paddle-shaft, and in the centre, passing over the projecting pieces of metal *p*, and *q*, and thereby forming a double truss. Through the paddle-shaft is made a mortice, in which the paddle is inserted and secured by means of screw-bolts or rivets, passing through the paddle-shaft and paddle. Fig. 5, is a front view of one of the arms *i*, *i*, fixed upon the end of the paddle-shaft, and carrying the pin K.

Provided always, and I do not claim, as of my invention, any parts of the said paddle-wheel, hereinbefore described, which have been heretofore discovered by others, or which are now known to the public; but that I do claim, as of my invention, the guide-wheel and its axis, the metal strap, and the guide-frame, hereinbefore described; and also the combination of the said guide-wheel, metal strap, and guide-frame, or either of them, with a paddle-wheel, as hereinbefore mentioned. And I further declare, that although I have only described one form and position of my improved paddle-wheel or propeller, yet I hereby claim, as of my invention, the said improvements in paddle-wheels

or propellers, in whatsoever variety of form they may be made, and whether placed in an air-chamber, as hereinbefore mentioned, or at the sides of the vessel, (as common paddle-wheels are usually placed,) or in any other position in which they can be conveniently placed in the vessel, to be propelled through the water.—[*Inrolled in the Rolls Chapel Office, October,* 1839.]

To GEORGE MILLICHAP, *of Birmingham, carriage axletree manufacturer, for certain improvements on locomotive machines or carriages.*— Sealed 31st March, 1834.]

BY means of this invention, the driving power of locomotive carriages, may be more advantageously applied; and the carriages will also be enabled to surmount obstacles on the road.

The figure in Plate XVIII., represents the hinder part of a carriage, and shows the use of these improvements. The driving power is applied to the axle *a*, upon which is fastened the toothed wheels *b*, *c*;—these wheels take into the toothed wheels *d*, *e*, fastened on the axis *f*, the wheel *b*, taking into the teeth of the wheel *d*, and the wheel *c*, into the wheel *e*, which drives the wheels *g*, *h*, on the axis of the running wheels. The speed may be increased or lessened, by throwing either of the wheels *b*, and *c*, in or out of gear. The fore part of the carriage has two more running wheels, which are not shewn.

The patentee claims the combination of the parts *e*, *g*, *h*, and the proper "speed wheels" for actuating them, when the said parts *e*, *g*, *h*, are combined, for the more advantageous application of the driving power of locomotive machines or carriages.—[*Inrolled in the Inrolment Office, September,* 1834.]

To Robert Gill Ranson, *of Ipswich, in the county of Suffolk, paper-maker, and* Samuel Millbourn, *foreman to the said* R. G. Ranson, *for their improvements in the manufacture of paper.*—[Sealed 13th December, 1839.]

This invention applies to the manufacture of what is denominated endless sheets of paper; that is,—long lengths of paper, produced in a machine of the kind first introduced by Mr. Fourdrinier.

The improvements are distinct from the making of paper, and are designed for two auxiliary purposes; first,—for sizing the whole length of the sheet of paper; and secondly, for drying it after it has been so sized.

The long sheet of paper having been rolled upon a reel, that reel is placed upon an axle, in suitable bearings in the machine, and the end of the sheet drawn off and conducted into and through a vat, containing the liquid size. In order to guide the paper evenly through the sizing-vat, it is passed under a cylinder, mounted on an axle in the vat, which causes the paper to be thoroughly immersed in the liquor; and, on proceeding out of the vat, the paper is passed between a pair of pressing or squeezing rollers, which expresses all the superfluous size. The paper having been thus made to imbibe a sufficient quantity of size, the sheet is then rolled upon another roller, and taken away to the drying apparatus.

The rollers and cylinder, which lead the paper forward in this sizing machine, are worked by toothed wheels, connected to the driving gear of a steam-engine; and the delivery reel has a friction break, for the purpose of keeping the sheet of paper tightly distended.

Some modifications, as to form, are proposed; but the

contrivance, altogether, is exactly the same as has been long practised for impregnating paper and felts, with tar and other matters, for sheathing ships' bottoms.

The second head of the invention,—the machine for drying the paper,—consists of a series of what are called lantern drums; that is, open cylinders, the peripheries of which are formed of rails;—round these drums the length of paper is conducted, in a serpentine course, from the delivery reel to the receiving reel; and in the interior of each of the lantern drums, a rotary fan is mounted; which, being driven by pullies and bands, produces a powerful current or circulation of the hot air of the drying-room, and thereby causes the paper to dry very rapidly, as it passes through the machine.—[*Inrolled in the Inrolment Office, June,* 1840.]

To HOOTON DEVERILL, *of Manchester, in the county of Lancaster, gentleman, for his invention of a method of engraving and etching on cylindrical surfaces, for printing, and other purposes.*—[Sealed 31st March, 1834.]

THIS invention consists of a mode of transferring a pattern from a plain surface to a cylindrical one, for printing, and other purposes.

The pattern to be transferred, is placed under the tracing point, attached to the long arm of a pentagraph; to the short arm of which, is fastened a cross slide, from which a chain rises, and passing round a pulley on one end of a mandril, is again fastened to the cross slide. The mandril extends the whole length of a large frame, its ends resting on suitable bearings; and the said mandril is capable of sliding endways, as well as revolving in its bearings. On

this mandril is fastened the cylinder to be engraved, and five or more etching points, suitably weighted, and attached to one of the back beams of the frame, rest upon the top of the cylinder. Five or more drills for engraving, fastened on sliding carriages, are placed at the front side of the cylinder; and when they are required to act, are kept in contact with it by springs, being turned by bands from a drum beneath.

In order to engrave the pattern on the cylinder, the tracing point of the pentagraph is passed over the pattern on the plain surface; and its motion being communicated to the cylinder, by the cross slide and pulley, will cause the cylinder to turn round, either one way or the other, according as the tracing point is moved to the one side or the other; and the intended pattern will be engraved or etched on the cylinder by the drills or points pressing upon it.

The patentee does not claim any of the parts separately, which have been before in common use, but he claims the combination thereof, and more particularly the application of a pentagraph, by which the motion of the tracing point, over a pattern or design, on a plain surface, may be transferred to a cylindrical surface, in order that the same cylinder may be engraved, by stationary points impinging thereon.—[*Inrolled in the Inrolment Office, September,* 1834.]

To HERMAN HENDRIKS, *of the Strand, in the county of Middlesex, gentleman, for an invention of improvements in the process of dyeing wool and woollen fabrics, yellow,—communicated by a foreigner, residing abroad.* [Sealed 8th April, 1834.]

THESE improvements consist in the application of the double decomposition of chromate of potash, or bi-chro-

mate of potash, or chromate of soda, and a soluble salt of lead, to dyeing wool and woollen fabrics, yellow.

The cloth is passed through the following baths, in succession, in the order that they are numbered:—

Bath No. 1.—This bath is prepared with acetate of lead, (or any soluble salts of lead,) of the specific gravity of two degrees of the areometer for salts. This bath is to be heated by steam, not condensed, and of a temperature of from 100° to 105° Far.

Bath No. 2.—This bath is prepared with chromate of potash, or bi-chromate of potash, (the chromate of soda will answer equally well,) of the specific gravity of three degrees. This bath is heated by the same means as No. 1, to 160° Far.

Bath No. 3.—This bath is composed of water, and may be used at the ordinary temperature, or a little warmer, say from 60° to 70° Far.

Bath No. 4.—This bath is composed of water, slightly acidulated with acetate of lead, so as to have only a very faint acid taste.

The cloth, after passing through the baths, is finished in the usual manner.

Claim:—The application of the process of the double decomposition of chromate of potash, or bi-chromate of potash, or chromate of soda, and a soluble salt of lead, to the dyeing of wool and woollen fabrics, yellow.—[*Inrolled in the Inrolment Office, October*, 1834.]

To JOSEPH SHEE, *of Lawrence Pountney Place, in the city of London, gentleman, for his invention of certain improvements in distillation.*—[Sealed 22nd April, 1834.]

THESE improvements consist, in working a series of stills, by the same heat that is requied to heat the first.

The patentee uses three stills beside the usual one, which communicate with each other by different pipes.

Now, supposing the operation of distilling about commencing,—the first still is filled with the wash, which, on being converted into vapour, passes, by means of a suitable pipe, through the different stills in succession, and through a spare vat, which contains the next charge of wash, in order to heat the same, and then into the worm tub, where it is condensed; from thence it passes into a reservoir beneath the second still, and from that is pumped into a tub above that still, into which it is then allowed to run.

The first still now receives its second charge of wash, which, passing off in vapour the same as before, heats the contents of the second still, which likewise passes off in vapour through the other two stills, and into the worm tub; thence into the reservoir beneath the third still, which receives that condensed product, whilst the second still receives the condensed product of the second charge of the first still.

The first still now receives its third charge of wash, which, passing off in vapour, heats the contents of the second and third stills; the vapour from the second still, passing through the third, assists in heating its contents. The distilled products again advance; those from the third still being transferred to the fourth, those from the second to the third, and those from the first to the second; and the first still receives its fourth charge of wash, which is again turned into vapour. The vapour from the first still passes through the other stills, as before, being assisted in heating the contents of the fourth still, by the heat of the vapours from the third and second, which likewise pass through the fourth still. The vapour from the fourth still, after being condensed in the worm tub, passes into a reservoir, from which it is taken away ready for use, and the

distilled products advance one step as before; but it must be borne in mind, that the different vapours, in passing through the different stills, are kept separate, each in its own pipe or tube; and, although four stills are mentioned, either more or less may be used.

The patentee claims the method and process above-described, whereby he is enabled to effect the re-distillation of products in a series of stills, working simultaneously by the same heat that is required to heat the first one; whereby the product is advanced one stage in the necessary distillation, at each charging of the first still; and, whereby the products are kept separate.—[*Inrolled in the Inrolment Office, October,* 1834.]

To AUGUSTE VICTOR JOSEPH D'ASDA, *of Adam-street, Adelphi, in the county of Middlesex, gentleman, for certain improvements in pumps, or machinery for raising water and other fluids,—communicated by a foreigner residing abroad.*—[Sealed 4th April, 1834.]

THESE improvements consist in making a double lift force-pump, with only one barrel. The barrel in this pump is placed horizontally, and has two suction valves, opening inwards at the bottom, one at each end; but which have no communication with each other, being separated by the piston. There are also two forcing valves, open outwards at the top of the barrel, one at each end, which are likewise separated by the piston; but the water from both proceeds to the same air vessel, at the top of the pump. The piston has a reciprocating horizontal motion, which is given to it by the following arrangement of parts:—

On an axis, just above the barrel, is suspended a sector,

which is worked by the up and down motion of the handles; to each end of this sector, is fastened two chains, one on each side, and the other ends of these chains are fastened to opposite cross-pieces. These cross-pieces are attached, one to each end of the piston rod, which protrudes from both ends of the barrel; the cross-pieces are connected with each other by side-pieces, forming a kind of frame, which, being moved backwards and forwards by the sector, moves the piston likewise, and so pumps up the water. The water in this pump flows with one continued stream, as much water being raised by the backward stroke of the piston, as by the forward one.

The valves are of the kind called disk valves, but any other kind may be used; and other means may likewise be used for moving the piston, without departing from the spirit of this invention.

The patentee does not claim any of the parts separately, but only the combined mechanical arrangement herein described.—[*Inrolled in the Inrolment Office, October*, 1834.]

To Henry Hardingham Leggett, *of Fulham, in the county of Middlesex, gentleman, for certain improvements in the art of printing in colours.*—[Sealed 23rd November, 1833.]

This invention consists, first, in a new printing ink, to be applied to the purpose of printing in colours; to which the required colour is given, by certain chemical re-agents. Secondly,—In the mode of applying the said re-agents to prints or patterns, printed with the said ink. Thirdly,—Certain machinery for that purpose.

A quantity of logwood chips are boiled, for one hour, in

eight times their weight of water, (soft water is best;) the liquor is then drawn off, and strained through a hair sieve. The chips are again boiled, for two hours, in another portion of water, of the same weight as the first, and the liquor is again drawn off, and strained. The two decoctions are then mixed together, and a quantity of English verdigris, one-thirtieth the weight of the logwood chips, is mixed with water, to the consistence of cream; the whole, or part of it, is then poured gradually into the decoction, adding it till the colouring matter sinks to the bottom;—the precipitate being of a dark grey, or blue-black colour, and the supernatant liquor is clear and colourless. The supernatant liquor is now drawn off, by a syphon, and the precipitate is placed on a filter, made of fine cotton or woollen, in order to drain off and evaporate any moisture that may remain. When dry, it may be ground with oil, or any other liquid, according to the usual method of making printers' ink.

The print or pattern, whether on copper, steel, wood, or stone, is printed in the usual manner, with this ink. Then, to those parts of the print or pattern, which, if it were a painting, would be coloured yellow, is applied a weak solution of vegetable acid, or any acidulous salts, (bitartrate of potash, or tartaric acid, is best,) which will change the neutral grey of the ink to yellow. To those parts which are to be red or orange, a weak solution of vegetable acid, or any acidulous salts, is applied, (oxalic acid is best,) which will change the neutral grey of the ink to red or orange. To those parts intended to be pink or crimson, is applied a solution of very dilute sulphuric, or other mineral acid, which will change the neutral grey of the ink to pink or crimson. To those parts which are to be coloured lilac or violet, is applied a solution of nitro-muriate of tin, or a solution of alum, which will change the neutral grey of the

ink to lilac or violet. To those parts which are to be blue, a solution of bi-carbonate of ammonia, or other alkali, is applied. To those parts which are intended to be purple, a dilute solution of bitartrate of potash, or other vegetable acid, is applied first, and afterwards a solution of the alkalies above-mentioned. If a very delicate pink is required, the ink may be made of Brazil chips, instead of logwood chips.

The chemical re-agents may be applied with a common hair pencil, or by either of the following processes, which constitute the second part of this invention:—

Blocks are formed, similar to those used by paper-stainers, for printing silks, &c. A block being provided for each colour, those parts of the drawing, which are required to be of the same colour, are left in relief on the block set apart for that colour; and the blocks, being provided with the re-agents above-mentioned, are applied in succession to the print or pattern.

The following is the second of these processes:—The print or pattern is copied on thin sheets of metal, paper, or other substance. A sheet of metal is provided for each colour; and those parts which are required to be of the same colour, are cut out with a graver, knife, or other instrument. The sheets are placed over the prints, and the re-agent is applied with a roller,—a separate roller being provided for each re-agent. The roller is a cylindrical block of wood, covered with felt of the kind commonly used for hatting-blocks; it is fastened to the block by small metal pins, or by dissolved shellac.

The third part of this invention, is the machinery for applying the re-agents, which is equally applicable for original colours; and the patentee, in describing the machinery, uses the word "colours," in place of "re-agents."

Fig. 1, Plate XVII., shews the machinery, with the

roller *r*, receiving colour. Fig. 2, shews it passing over the metal plate. *a*, is the platform, upon which the workman stands; *b*, is a winch-handle, that turns the pinion *c*, which is fastened on the working-shaft; the pinion *c*, turns the large wheel *d*; the teeth of this wheel take into the pinion *e*, and by this means the wheel *f*, is turned. The wheel *f*, works the rack *g*, by which the irregular rod *h*, is moved.

There is another pinion on the same axis as the pinion *e*, and the wheel *f*; which pinion has eight teeth, which are divided into two sets of four, a space being left between each set; it turns the wheel *i*, by which means the pinion *j*, on the same axis, is also turned. The pinion *j*, turns the toothed wheel *k*, which turns the large drum or narrow cylinder *l*, by the connecting rod *m*.

The prints or patterns to be coloured, are placed on the cogs *n*, of the drum *l*. The metal plate *o*, shewn in fig. 2, is fastened to the frame *p*; this frame is raised by the quadrant *q*, after the colouring roller *r*, has passed over the metal plate, in order that a fresh cog may come under it; and during the time, occupied in raising the frame *p*, the colouring roller is moved (by the irregular rod *h*, to which it is attached,) on to one of the tables *s*, in order to take a fresh supply of colour. The colour is spread over the tables *s*, by the feeding rollers *t*, *t*, which are moved backwards and forwards by studs on the irregular rod *h*, which work in the guides *u*, of the feeding rollers. The feeding rollers take the colour from the colour beds *v*.

It will be seen that the colouring roller *r*, cannot descend so low as the metal plate, except when the raised parts of the irregular rod rest on the supports *x*; sufficient pressure is given to the colouring roller, by the weight *w*.

The quadrant *q*, is worked by the rod *y*; which rod is moved one way by the spring *z*, and the other way by the

levers a^1, and b^1; which levers are moved by two tappets, on the wheel *f*.

The colouring frame is supported by rods, provided with pins, which step into grooves in the rollers c^1, and d^1; motion being given to the roller c^1, by a series of teeth, on the side of the large wheel *d*, taking into the teeth of that roller, and are so arranged that they commence acting on the teeth of the roller, as soon as the last of the series 4, quit the teeth of the pinion *e*. The motion is communicated from the roller c^1, to the roller d^1, by the endless cord 5.

The patentee claims, firstly,—the printing ink hereinbefore described, as applied to the purpose of printing in colours; the required colour to which may be given by various chemical re-agents acting upon it. Secondly,—the mode of applying such re-agents to prints or patterns, printed with the said ink, for the purpose of colouring them; whereby a great saving of time and expense is effected, in all cases, where many coloured copies are required, of any particular print or pattern. Thirdly,—the machinery, hereinbefore described, as applied to the purpose aforesaid.—[*Inrolled in the Inrolment Office, May*, 1834.]

Scientific Notices.

ELEMENTS of ELECTRO METALLURGY, or the Art of Working in Metals by the Galvanic Fluid, by ALFRED SMEE, Surgeon to the Bank of England, &c. &c.—Octavo, pp. 163, bound in cloth, gilt edges, price 10*s*.—Published by E. PALMER, 103, Newgate Street; and Longman & Co., Paternoster Row.

Few discoveries have been made, within the recollection of the present generation, which have created so much interest, or

are likely to lead to such important results, as the use of Voltaic Electricity, in the reduction of metals from their solutions.

It is a singular fact, that this assistant to mechanical ingenuity, made its appearance almost simultaneously with the beautiful discovery of M. Daguerre; and it is a source of just pride for us to remember, that one of these boons was afforded us by our native soil; for there can be no doubt (although some have attempted to raise such doubts), that Mr. Spencer, of Liverpool, was, if not the sole founder, at least the contemporaneous labourer with professor Jacobi, of Petersburgh; and it must also be gratifying, to those who have given the history of this science their attention, to perceive that most of the subsequent improvements, have sprung from the genius of our own countrymen. To Mr. Murray we are indebted for that beautiful and simple plan of precipitating metals, upon non-conducting substances, by the use of plumbago; and we are now enabled to produce fac-similes of engravings on wood, plaster casts, or sealing wax impressions, with the greatest accuracy.

The most perfect test of the value of plumbago coating we have seen, was effected by Mr. Murray;—he took a sealing wax impression of a button, manufactured on Mr. Barlow's plan, on which, lines were described, to the amount of 5000 to the inch; this sealing wax impression, after receiving a coat of plumbago, constituted a mould or matrix, on which the metal was precipitated, and the copy was found to possess all that beautiful effect, for which the original was so justly admired.

We take this opportunity of recording one or two principal facts in the history of this science, because we feel that the names of those to whom we are really indebted, should not be veiled from posterity, in the mist of contradiction which envy usually throws around them.

On this occasion we think we may venture to remind our readers, that we were the publishers of the first impressions which were taken from an electrotype plate; and, upon examination, we find, that although a large number of impressions have

been produced, it is scarcely altered in its printing qualifications, and is in a much better state of preservation than the original, which was printed as an accompaniment; we should not, however, have intruded our claims upon public attention, had it not have been rather positively asserted, that we had no right to such claims.

In the work before us, we see much to congratulate the manufacturer and public at large upon. A gentleman, of known scientific attainments, has devoted considerable attention to the subject, and has given such practical rules in the reduction of metals (or, as he most properly calls it, Electro Metallurgy), as will be highly acceptable to all those interested in the subject.

The first book is devoted to a concise treatise on the theory of Galvanic Batteries; this is followed by an explanation of the laws relating to the reduction of metals, deduced from experiments prosecuted by the author, with much industry; the third book is devoted to instructions for gilding plates, &c.; the fourth to various applications of the reduction of metals, by Voltaic Electricity; and the fifth and sixth to the use of this art, in producing surfaces, suitable for printing; and embraces every practical instruction required for obtaining fac-similes of plates, either of copper or steel, engravings on wood, or any other substance; and a mode of engraving or etching, by means of Voltaic Electricity.

There is much that is new and valuable in this work; and the author has laid down laws regulating the reduction of metals; and has also given instructions for obtaining such metals, either in a state of extreme hardness and brittleness, or with the opposite qualifications of ductility and malleability, or of any state between these; he has also shewn us, (and we believe the fact was only previously known, as relates to copper, silver, and gold, and the two latter but very imperfectly,) that any metal may be reduced from its salts, to either of the above states, by following the instructions which he gives. There are also many minor practical points, which will be found of great value to those prosecuting this science; and we, therefore, feel great

pleasure in recommending the work to their attention; but we confess, we should have felt much more pleasure in doing so, had it been brought before the public more in unison with the present liberal conduct of publishers. The price will prevent numbers from availing themselves of the fruits of Mr. Smee's researches, to whom they would be found of great value; but when, on being purchased, it is found that fully one-third of the contents consists of advertisements, we think it will justly bring some discredit on the publishers; and we should not be doing our duty to the public, if we did not allude to it.

We trust, that should the work meet with such a sale as its real merits deserve, and thereby require a second edition, the publishers will not overlook this point, and extend the book to the same thickness, with useful information, which, if properly arranged, would be highly interesting from such a new and extensive subject.

REPORT OF TRANSACTIONS OF THE INSTITUTION OF CIVIL ENGINEERS.

(Continued from page 322, Vol. XVII.)

"On setting out Railway Curves."

By Charles Bourns, Assoc. Inst. C. E.

Mr. Bourns having been engaged in setting out the Taff Vale Railway, through a country presenting circumstances of more than ordinary difficulty, which rendered it necessary to vary the radii and the flexure of the curves frequently, his attention was particularly directed to this subject; and he has treated it in this paper clearly and successfully, demonstrating the several cases geometrically, and generally in a plain and satisfactory manner. He calls attention to the inaccuracy of applying a square to the setting out of segmental curves, particularly those of short radii, and recommends an offset staff as theo-

retically correct, and practically much more convenient. The general rule to find the offset is—"Divide the number of inches in the chain used by the number of such chains in the radius of the required curve; the quotient is the offset in inches." The paper is accompanied by a table of offsets for curves of different radii; which the author found extremely convenient for use in the field.

The paper being altogether mathematical, is not adapted for publication in abstract; but it will be given at length, with examples and diagrams, in the Transactions of the Institution.

"Description of an Instrument for describing the Profile of Roads."
By Henry Carr, Grad. Inst. C. E.

The object of the author was the construction of a machine, which, being drawn along any road of moderate even surface, should describe the section of the line over which it passed. It is evident, that if a pendulum be suspended from a frame, standing perpendicularly, when the machine rests on a horizontal plane, on passing over a plane inclined at any angle with the horizon, the pendulum must form the same angle with the frame, the tangent of which angle, in terms of the radius, will be the rise or fall of the plane. The duration of the tangent will be determined by the paper on which the section is drawn being made to traverse at a speed proportionate to the distance passed over; and the extent, by the difference of the speeds of a nut and screw, which are made to revolve in the same direction—the nut turning at a constant velocity, and the screw at a speed differing from that of the nut in proportion to the tangent, slower or faster as the tangent is *plus* or *minus*, raising or lowering the nut according to the deviation of the plane from the horizontal line.

The machinery is set in motion by the wheels of the carriage, and a series of wheels and pinions, of given diameters, cause the ground line and datum line to be drawn simultaneously by two

pencils on a paper, which gradually unfolds itself from one drum, and is transferred to another at the rate of 16 inches per mile passed over, or on a scale of 5 chains to the inch. A profile of a line of country may thus be obtained with sufficient accuracy for a preliminary survey.

A comprehensive perspective drawing accompanies the paper and explains the construction of the machine.

May 12, 1840.

The President in the Chair.

"Photography, as applicable to Engineering."
By Alexander Gordon, M. Inst. C. E.

The object of the author in this paper is to direct general attention to the advantages which may be expected to result to the profession of the Civil Engineer from the discoveries of Mons. Daguerre and others, in enabling copies of drawings, or views of buildings, works, or even of machinery, when not in motion, to be taken with perfect accuracy in a very short space of time and with comparatively small expense. This system of copying not only the outline, but the tints of light and shade, united with accurate linear perspective, he contends may be easily adapted to the purpose of the engineer, as well as to all those professions in which the art of drawing is used. The photographic apparatus has already been employed to bring before us exact copies of the most interesting monuments of antiquity, the French antiquarians and artists having found it more easy and correct to Daguerreotype the Egyptian monuments and decipher the hieroglyphics at their leisure, than to labour over the originals.

The subject is divided into two branches; the first being the art of copying drawings and plans, by the transmission and absorption of light, by prepared paper. The drawing to be copied is placed between two pieces of plate glass, held down

in close contact with a sheet of photogenic paper, prepared by being washed over on both sides with a neutral solution of nitrate of silver of a specific gravity of 1.066, and afterwards with a solution of common salt and water (1 lb. of salt to 25 pints of water). The paper thus prepared must be dried and kept in the dark, on account of its peculiar delicacy. The rays of the sun are then permitted to pass through the white portion of the drawing or print, while they are interrupted by the black lines, and more or less by the tinted portions. The rays of light thus act upon the prepared paper, and produce in a few minutes a reversed copy, reproducing the lights of the original in shadows; this can be remedied by taking a second copy from the first, and thus the shadows are restored to their original positions. To destroy the sensitiveness of the prepared paper and preserve the copy, it is soaked in pure water, which carries off the excess of nitrate of silver, then covered with a solution of hypo-sulphite of soda, of a specific gravity of 1.055, and again washed in pure water, so that when dried it is permanently fixed. It is evident that a copy thus obtained must be exactly like the original, and the value of such a process may be readily estimated by engineers.

The second branch, which is named "Daguerreotype," after the distinguished artist who brought it to its present state of perfection, is of a much higher order. This is the art of fixing and preserving on the surface of a polished silvered plate the images collected in the focal plane of a camera obscura.

The process is rather complicated, but it may be thus briefly described. The surface of the silvered plate being cleaned and polished very perfectly, by means of finely levigated pumice stone, olive oil, and cotton, is rubbed lightly over with diluted nitric acid, in the proportion of 1 pint of acid to 16 pints of distilled water; it is then subjected to the heat of charcoal or a spirit lamp, until a firm white coating is formed all over the surface of the silver. The plate is then suddenly cooled. This process is repeated three times. It is placed in a dark chamber, with the face or silver surface downwards, where it is

acted upon by the spontaneous evaporation of iodine; this condenses upon the silver, and produces a fine gold-coloured surface, extremely sensitive to the impressions of light. It is then placed in a camera obscura, the light having been until then perfectly excluded from it. It there receives the impression of any images brought within the focal plane; and by subsequently exposing it in a dark, close chamber, with its silver surface downwards, to the fumes of heated mercury, the images are rendered visible; to fix the images so received, the iodine is removed by dipping the plate in pure water, and then washing it either with a weak solution of hypo-sulphite of soda, or a saturated solution of common salt, and finally dipping it in distilled water and drying it. It should then be framed and glazed, to preserve it from external injury, and the picture will remain unchanged.

Attempts have been made to use this process for preparing the plates for engravers, as much time and cost would thereby be saved, but hitherto it has not been done to any extent.

The author presses upon the Institution the applicability of these processes to engineering uses, and quotes the remarks of Mons. Arago—"That photographic delineations having been subjected during their formation to the rules of geometry, we may be enabled by the aid of a few simple data to ascertain the exact dimensions of the most elevated parts of the most inaccessible edifices."

Mr. Cooper, Senior, introduced the subject of photography by explaining, and illustrating by instruments and diagrams, the principles of the division and dispersion of the rays of light, according to the Newtonian theory, as well as the most recent researches into the subject. He described the chemical properties of light—its affinity for certain combinations, such as chloride of silver—its heating powers—the different effects of the rays on vegetation—and the application of these known principles to photography. He then explained the chemical pro-

perties of the chloride of silver, iodine, and other substances used in the process. In alluding to the probable uses of the Daguerreotype, he observed that the process might be employed to make drawings of machinery, as graduated scales might be fixed to certain parts of the objects, and they would be copied in their relative proportions to the machine.

Mr. Cooper, Junior, illustrated Mr. Gordon's communication by explaining the photographic apparatus, and in the process of obtaining a specimen of Daguerreotype by means of the oxy-hydrogen light, He described, among other points, the difficulty of obtaining pure silver upon the copper plates, as, for the advantage in rolling, the manufacturer will introduce an alloy of ½ to 1½ per cent. On this account, acid is used so repeatedly in cleaning the plates, that any particles of copper which have been rolled into the surface may be carried off. He explained his improvement to the iodine box, which consists in spreading the iodine all over the bottom of a tray lined with glass, and covering it with a piece of card-board, which becomes saturated with the fumes of the iodine, and on the silvered plate being placed over it, acts equally over its surface, instead of partially, as in the old system of placing the iodine in a mass in the centre of the tray. He had found this to be a great improvement. The shortest time in which he had obtained a photographic picture in England was 11 minutes; while, during a gloomy day in November, it took an hour and a half to procure a moderately good one.

"An Universal Screw-Jack."

By George England.

This machine, a model of which was presented to the Institution, is intended for raising heavy weights, and moving them in any required direction; the vertical motion is similar to that of a common screw-lifting jack, and the lateral motion is communicated by a ratchet lever to a horizontal screw, working in bear-

ings on a strong cast-iron bed, with planed surfaces, through a double nut, attached to the base of the jack. The jack has been found useful for erecting heavy pieces of machinery, and for replacing railway carriages and locomotives on the rails, when they have accidentally been thrown off.

"Description of a Traversing Screw-Jack."

By J. W. Curtis.

The screw-jack is attached to a plank with a rack in it, and slides in a groove in another plank, which is placed beneath it, across the railway; in the lower plank is a rack, by means of which and a hooked lever, the jack, with the engine or any other weight resting upon it, is drawn easily across the rails and lowered to its proper position. By this apparatus, engines and carriages of considerable weight have been replaced on a railway by two men, in a very short space of time.

A model of the machine was presented to the Institution.

May 19, 1840.

The President in the Chair.

"Description of a new Gas Regulator."

By James Milne.

The object of this instrument (which the inventor exhibited in action, and presented to the Institution) is to regulate the supply of gas to burners, so that any variation in the pressure, arising from extinguishing the adjacent lights along the line of the street main, or in the different floors of manufactories, shall not affect those lights which are supplied through the regulator.

The regulator consists of a cylindrical outer case, to which is affixed a water guage, to show the pressure; to the top is attached an inner cylinder, open at the lower end, and reaching nearly to

the bottom of the outer case; the gas is introduced from beneath by a tube in the centre, terminating in a conical valve at the top: the male part of the valve is fixed by three arms to the top of a float, which moves freely in the space between the inner cylinder and the centre tube; the areas between the outer case and the inner cylinder, and between the inner cylinder and the centre tube, being alike, the pressure of the gas acts upon the water within the inner cylinder, and causes it to rise in the outer case just as much as it is depressed in the inner space. This depression carries down the float with the male part of the valve attached to it, and thus diminishes the aperture of the supply pipe, until the pressure is relieved by other burners being lighted, and enables the supply of gas to be in proportion to the demand. The pressure may by regulated at will, by increasing or diminishing the quantity of water in the cylinders, and it is shown correctly by the graduated glass guage. This apparatus has been found, in an experience of two years, to effect a saving of about 20 per cent., independent of its ensuring a perfect equality to all the burners in action. Drawings of the instrument accompanied this communication.

Mr. Lowe believed the "gas regulator" to be an efficient instrument. It was of the utmost importance that the light from gas should be steady and equal, as the nerves of the eye were more injured by an unsteady than by an intense light. In large establishments, the greatest care would scarcely prevent constant variation in the lights, so that an efficient means of producing regularity must be valuable.

'On the Properties and Chemical Constitution of Coal, with Remarks on the Methods of increasing its Calorific Effect, and preventing the loss which occurs during its Combustion." By Charles Hood, F. R. A. S., &c.

It appears that, previous even to the invasion of the Romans,

coal was used as a fuel in Great Britain; but such was the prejudice against it, that wood was the fuel generally in use among the higher classes until the eighteenth century, when the supply of it diminished so considerably as to render necessary the substitution of coal; and from that time the increase in its consumption has been immense.

Previously to the seventeeth century, the smelting of iron and all other metals was performed by charcoal; but the attempts of Sturtevant and Ravenson in 1612-13, and of Dudley in 1619, to introduce the use of coal or coke in blast furnaces, having proved the possibility of success, the progress of the innovation, though slow, was certain, and led to the transfer of the iron works from many of the original positions in the midst of forests to the coal districts, where they are now placed.

The author considers his subject under three heads:—1st, The chemical character and composition of coal; 2dly, Its properties as a combustible; and 3dly, The nature and application of its various gaseous products.

1st. The opinion that coal is a compound of carbon and bitumen, has been objected to by some chemists, on the ground, that by no process hitherto pursued in analyses, has it been possible to resolve it entirely into these two substances: even at a low temperature, a quantity of gaseous matter is thrown off, and at an elevated degree of heat, an evident decomposition of the bitumen takes place. Even anthracite contains a small portion of volatile matter, its component parts being carbon, oxygen, hydrogen, and nitrogen; the hydrogen being either combined with the oxygen, to form water, or with a small portion of carbon, to form carburetted hydrogen, which exists in a gaseous state in the pores of the coal. In bituminous coal, the hydrogen is combined wtth a larger portion of oxygen and nitrogen; the mechanical difference being, that the bituminous and free-burning coals (more particularly) melt by heat when the bitumen reaches the boiling point, whereas anthracite is not fusible, nor will it change its form, until it is exposed to a much higher degree of temperature.

Two tables of the analyses of different coals, are given from the authorities of Mushet, Thomson, Vanuxem, Daniells, Ure, and Reynault; No. 1 showing the proportions of carbon, ashes, and volatile matter, with the specific gravity of the coal and of the coke; and No. 2 showing the proportions of carbon, hydrogen, azote, and oxygen. These tables show that the largest quantity of carbon (92.87) is contained in the Kilkenny anthracite, and the least quantity (64.72) in Canal coal; and that the nature of the volatile matter greatly affects the quantity of coke—the aggregate quantity of the gaseous products of coke, splint, and cherry coal, being very nearly similar; while the quantity of coke obtained from these different species varies more than 45 per cent.

The author then points out the continual presence of azote, which quits the base with the greatest difficulty; and also the affinity of sulphur, not only for the coal, but for the coke, as it is rarely found to have been completely expelled even from the most perfectly made coke; the only coal found to be even partially free from it being anthracite, in some species of which no traces of its presence are found.

2dly. The application of coal, as a fuel, depends on the chemical change which it undergoes in uniting, by the agency of heat, with some body for which it possesses a powerful affinity. In all ordinary cases this effect is produced by its union with oxygen. When coal is entirely consumed, the carbon is wholly converted into carbonic acid gas and carbonic oxide, and the hydrogen into water in a state of vapour. The atmosphere supplies the necessary oxygen for this purpose; and in this state the products of the combination are nearly or quite invisible, both of them being almost colourless fluids: if, therefore, any smoke be visible, it is the result of imperfect combustion. Some calculations are given to ascertain the amount of loss that is sustained when the smoke escapes unconsumed; from which it appears, that with bituminous coal about 37 or 38 per cent. more heat is produced when the smoke is consumed than when it escapes freely. Many modes of consuming smoke have been

attempted; those which appear to have been attended with the greatest success are—1st. Causing the smoke from the fresh coals to pass through or over that portion of the fuel which is more perfectly ignited; 2dly. Supplying heated air to the top of the fuel, as well as admitting cold air through the ash-pit in the usual manner; and 3dly, Throwing a jet of steam into the furnace or into the chimney. The various modes of carrying into effect these plans are briefly alluded to; from them a few may be selected. Robertson's plan was to use inclined furnace bars, where the fresh coals were placed close to the fire-door, and, being there partially carbonized, gave out the gas, which in passing over the mass of incandescent fuel, was ignited, and became active flame, thus economizing fuel and preventing smoke. In this and similar cases, by the slow distillation of the coal, a gas is produced, which not only inflames at a lower temperature than the dense olefiant gas produced by rapid distillation, but which only requires for its combustion a quantity of oxygen, never exceeding double its own volume, or ten times its bulk of atmospheric air, while olefiant gas requires three times its own volume of oxygen, or fifteen times its bulk of atmospheric air. The elimination of a gas which burns with so small a portion of oxygen is, therefore, the principal cause of the non-production of smoke in furnaces of this description. The second mode of consuming smoke is founded on the necessity which exists for a large supply of air being requisite to inflame the gases given off from coal by a rapid and intense heat; and this is accomplished by introducing a quantity of heated air above the burning fuel. When a quantity of fuel is thrown into a furnace, the increased thickness of the mass opposes additional resistance to the passage of air through the bars; the temperature of the furnace is lowered, and an increased volume of gas is at the same time given out. If at this moment a quantity of air, heated to the temperature of the gas, be admitted, the gas immediately inflames, and that which would have produced a dense black smoke passes off in the invisible state of carbonic acid gas and vapour of water. Different gases

require different degrees of heat to inflame them; and this explains the easy combustibility of the volatile products of coal when the heat is so managed as to produce those gases which inflame at the lowest temperature. A larger quantity of air is required at the time that the coal is first thrown on, than at a subsequent period; therefore, when economy is studied, the supply of air should be gradually diminished as the mass approaches an incandescent state. The use of heated air has produced most important results in the manufacture of iron with bituminous coal, and also with anthracite; the latter fuel having been almost neglected until the recent application of this principle of employing heated air to promote its combustion, although it is known to be capable of producing perhaps a more intense heat than any other carbonaceous fuel. The rationale of the third plan, of consuming smoke by injecting a jet of steam into the fire or the chimney, is less obvious than the others. In 1805, Mr. Davies Gilbert observed, that whenever the waste steam of one of Trevithick's engines was permitted to escape into the chimney, the smoke from the coal was rendered invisible. Subsequent experiments confirmed this fact; and it was supposed that the steam, being decomposed, furnished oxygen to support combustion. The author combats this opinion, and accounts for the effect by the increased draught of the furnace, caused by the jet of steam into the chimney, by which means a larger portion of air is brought into contact with the burning fuel; thus supplying the previous deficiency of oxygen to the fire, and promoting the combustion. As steam is only about half the weight of air at a like temperature, and the power of all gaseous fluids to ascend is "*inversely* as the square roots of their specific gravities," the velocity of its escape by the chimney, compared with common air of the same temperature, is about as 1·4 to 1; therefore the compound mixture of steam, air, and carbonic acid gas, will escape with a considerably increased velocity, and more air must consequently enter the furnace. It appears that about 10 per cent. of the total quantity of steam generated, is necessary to effect the combustion of the smoke by

this means; therefore, unless the waste steam only be used, the saving of the fuel must be reduced by this amount. Brief mention is made of the experiments of Messrs. Apsley Pellatt, Parkes, and the Chevalier de Pambour, proving that a given quantity of oven coke will produce as much heat as the coal from which it was produced; and of the various kinds of artificial fuels which have been invented, especially that composed of resin and peat coke, of which the author remarks that its combustion probably produces a mechanical effect, as the hydrogen is converted into water into a state of vapour, which escapes through the chimney with a great velocity, and consequently a large quantity of air is drawn into the furnace, and a more perfect combustion of the fuel is the result. In the same manner he accounts for the necessity which exists for having the openings between the bars, wider in a furnace in which coke is burned, than in one used for coal. In opposition to the general opinion, he considers that less air is required for the consumption of coke than for coal; the carbon only requiring 2½ times its weight of oxygen for its combustion, while the hydrogen contained in coal requires eight times its weight of oxygen: and the only reason that the openings between the bars are required to be wider in the former than in the latter case, is in consequence of the draught being so much slower during the combustion of coke.

3dly. "On the nature and application of the volatile products of coal." In treating this portion of the subject—many of the observations on which have been necessarily anticipated in the preceding sections—the author traces the application of carburetted hydrogen gas, to the purposes of artificial illumination, from the year 1798, when its first successful application was made by Murdock at Soho. He then proceeds to Dr. Henry's investigations of the phenomena of its production and combustion; the variation of the intensity of light obtained from carburetted hydrogen, due to the proportion of carbon contained in it; the difference in the gas obtained from different qualities of coal; the superiority of the illuminating power of the gas from Cannel

coal; and the still greater power of that produced from the decomposition of oil, which is 2 to $2\frac{1}{2}$ times greater than that of coal gas. He then mentions the other products of coal by distillation, such as ammoniacal liquor, carbonic acid and oxide, sulphuretted hydrogen, tar, essential oil, naptha, petroleum, asphaltum, and other substances. The paper concludes by pointing out the advantages which would result from the production of such gas as is usually given out at the beginning of the distillation of coal, as it contains two volumes of gaseous carbon united with two volumes of hydrogen, and its illuminating power is consequently more than double that of ordinary coal gas.

Mr. Parkes observed, that the quantities of air required for the combustion of different fuels, as determined in the laboratory and on the large scale of practice, were frequently very different. It might be quite correct that a given weight of coal would require more air for its perfect combustion than the same weight of coke. There was great difficulty in ascertaining the fact practically, under steam-boilers, as the gases given out by the coal must have air supplied to them, distinct from that which passed through the grate, to ensure their perfect ignition, and many circumstances prevented the consumption of air from being exactly measured. Generally, he had found it necessary to use wider spaces between the grate bars for coke than for coal. In some late experiments, very carefully made on a boiler invented by Mr. A. M. Perkins, equal weights of coal and coke required the same time for their destruction on the same grate, the apertures of the damper and the ash-pit door, which were used to govern the draught, being precisely the same. Coke effected a greater evaporation than coal at similarly rapid and slow rates of combustion; and in every case the temperature of an oil bath, at the foot of the chimney, was higher with coke than with coal. It must, however, be remarked, that no process had been used to ignite the gases which escaped from the furnace uninflamed. He had tried different kinds of coke, coal, and anthracite, at this boiler, and the same fuel in every instance

performed a greater evaporative effect at a slow than at a rapid rate of combustion. He thought that much of the air which entered the grate of a boiler, passed through the fire unconsumed for want of time to effect a sufficiently intimate combination with the fuel. In some experiments lately made at Swansea on the properties of anthracite, Dr. Schafœutl had found from analysis, that no less than 40 per cent. of the products of combustion taken from the chimney, consisted of oxygen, yet he had effected the large evaporation of 11 lbs. of water with 1 lb. of that fuel.

Mr. Field stated, that Mr. Cooper had expressed an opinion, that in the use of coke as a fuel, a less portion of heat reached the chimney than with coal, on account of the large quantity of unconsumed air that passed through the fire, owing to the open spaces necessarily existing between the pieces of such a dry fuel as coke; whereas in a fire made of binding coal, nearly the whole of the air combined with the fuel in its passage through the body of fire.

Mr. Pellatt observed, that although in practice, coke appeared to require more air to support combustion than coal did, yet long experience had taught him to believe, that when coal was exposed to a rapid combustion, it required more air than coke.

In answer to an observation that some experiments lately made on the measurement of the quantity of air which entered the blast furnaces of Sir John Guest, at the Dowlais Iron Works, might bear on the subject—Mr. Fairey objected to the application of such results to determine the question, as the air is injected with considerable force into a furnace; there is frequently a great reflux of blast from the Tuyere when the furnace is working close; whereas, when it is working open, the flame at the top shows that the passage of the air, through the mass of burning fuel, is very free, and that, consequently, a portion of it passes off unconsumed. He had found, in his experiments on blast furnaces, that, unless there was a redundancy of carbon, and a deficieucy of oxygen, there was no chance of making good iron.

List of Patents

Granted for Scotland subsequent to December 22nd, **1840.**

To Robert Cooper, of Petworth, Gloucestershire, for improvements in ploughs.—Sealed 24th December.

Henry Trewhett, of Newcastle-upon-Tyne, for certain improvements in the fabrication of china and earthenware, and in the apparatus or machinery applicable thereto,—communicated from abroad.—Sealed 24th December.

Charles Parker, of Darlington, flax spinner, for improvements in looms for weaving linen and other fabrics, to be worked by hand, steam, water, or any other motive power.—Sealed 24th December.

John Werthiemer, of West-street, Finsbury-circus, London, printer, for certain improvements in preserving animal and vegetable substances and liquids,—communicated from abroad, —Sealed 24th December.

Edmund Leach, of Rochdale, machine-maker, for certain improvements in machinery or apparatus for carding, doubling, and preparing wool, cotton, silk, flax, and other fibrous substances.—Sealed 28th December.

William Hickling Burnett, of Wharton-street, Bagnigge Wells-road, Middlesex, for improved machinery for cutting or working wood.—Sealed 28th December.

John Grylls, of Portsea, for improvements in the machinery used for raising and lowering weights.—Sealed 31st December.

Samuel Brown, of Hoxton, civil engineer, for improvements in making casks and other vessels, of or from iron.—Sealed 31st December.

William Henry Bailey Webster, of Ipswich, surgeon, for improvements in preparing skins and other animal matters, for the purposes of tanning, and the manufacture of gelatine.—Sealed 31st December.

Colin Macrae, of Cornhill, Perthshire, for improvements in rotatory engines, worked by steam, smoke, gases, or heated air; and in the modes of applying such engines to useful purposes, —being a communication from a foreigner.—Sealed 31st December.

Moses Poole, of Lincoln's Inn, London, for improvements in drying woollen and other fabrics.—Sealed 31st December.

Thomas Clark, of Wolverhampton, iron-founder, for certain improvements in the construction of locks, latches, and such like fastenings, applicable for securing doors, gates, windows, shutters, and such like purposes,—being a communication from abroad.—Sealed 6th January, 1841.

Hugh Unsworth, of Blackrod, near Bolton, for certain improvements in machinery or apparatus for mangling, drying, damping, and finishing woven goods or fabrics.—Sealed 7th January.

Henry George Francis Earl of Ducie, of Woodchester Park, Gloucestershire, Richard Clyburn, of Uley, engineer, and Edward Budding, of Dursley, in the said county, engineer, for certain improvements in machinery for cutting vegetable and other substances.—Sealed 8th January.

Thomas Spencer, of Liverpool, carver and gilder, and John Wilson, of Liverpool, lecturer on chemistry, for certain improvements in the process or processes of manufacturing metallic cylinders, and for engraving thereon; and for engraving on metals generally.—Sealed 9th January.

John Mason, of Rochdale, mechanist, and Alexander Stiven, of Manchester, engineer, for certain improvements in machinery or apparatus to be used for turning and boring purposes.—Sealed 13th January.

William Hill Darker, Sen., and William Hill Darker, Jun., both of Lambeth, engineers; and William Wood, of Wilton, carpet manufacturer, for certain improvements in looms for weaving.—Sealed 18th January.

John Aitcheson, of Glasgow, and Archibald Hastie, of West-street, Finsbury-square, Middlesex, for certain improvements in generating and condensing steam, heating, cooling, and evaporating fluids.—Sealed 20th January.

Joseph Haley, of Manchester, engineer, for an improved lifting jack, for raising or removing heavy bodies; which are also applicable to the packing or compressing of goods and other substances.—Sealed 21st January.

New Patents

SEALED IN ENGLAND.

1840 & 1841.

To John Buchanan, of the city of Glasgow, coach builder, for certain improvements in wheel carriages, whether for common roads or railways.—Sealed 28th December, 1840—6 months for inrolment.

William Bridges Adams, of Porchester-terrace, gentleman, for certain improvements in the construction of wheel carriages, and of certain appendages thereto.—Sealed 28th December—6 months for inrolment.

John Wells, of Vale-place, Hammersmith, gentleman, for certain improvements in the manufacture of coke.—Sealed 30th December—6 months for inrolment.

William Henry Kempton, of the City-road, gentleman, for improvements in cylinders, to be used for printing calicoes and other fabrics.—Sealed 30th December—6 months for inrolment.

Henry Adcock, of Winstanley, civil engineer, for improvements in the means or apparatus for condensing, concentrating, and evaporating aeriform and other fluids.—Sealed 30th December—6 months for inrolment.

William Hensman, of Woburn, machinist, for improvements in ploughs.—Sealed 31st December—6 months for inrolment.

Joseph Parkes, of Birmingham, button manufacturer, for improvements in the manufacture of covered buttons.—Sealed 31st December—6 months for inrolment.

William Newton, of the Office for Patents, 66, Chancery-lane, civil engineer, for certain improvements in the rigging of ships and other navigable vessels—being a communication.—Sealed 31st December.

Francis Burdett Whitaker, of Royton, in the county of

Lancaster, cotton spinner, for certain improvements in the machinery or apparatus for drawing cotton and other fibrous substances, which improvements are also applicable to warping and dressing yarns of the same.—Sealed 31st December—6 months for inrolment.

Joseph Stubs, of Warrington, file manufacturer, for certain improvements in the construction of screw wrenches and spanners for screwing and unscrewing nuts and bolts, —being a communication.—Sealed 31st December—6 months for inrolment.

Thomas Robert Sewell, of Carrington, near Nottingham, lace manufacturer, for certain improvements in obtaining carbonic acid from certain mineral substances.—Sealed 31st December—6 months for inrolment.

William Henry Kempton, of Pentonville, gentleman, for improvements in lamps.—Sealed 31st December—6 months for inrolment.

John Grylls, of Portsea, for improvements in machinery used for raising and lowering weights.—Sealed 31st December—6 months for inrolment.

Joseph Haley, of Manchester, engineer, for an improved lifting-jack for raising or removing heavy bodies, which is also applicable to the packing or compressing of woods or other substances.—Sealed 31st December—6 months for inrolment.

Louis Holbeck, of Hammersmith, gentleman, for improvements in obtaining or producing oil,—being a communication.—Sealed 31st December—6 months for inrolment.

Henry Scott, of Brownlow-street, Bedford-row, surgeon, for improvements in the manufacture of ink or writing fluids.—Sealed 31st December—6 months for inrolment.

Charles Golightly, of Gravel-lane, Southwark, gentleman, for a new apparatus for obtaining motive power.—Sealed 4th January, 1841—6 months for inrolment.

George Child, of Lower Thames-street, merchant, for improvements in the manufacture of bricks and tiles, part of which improvements are applicable to compressing peat and other materials,—being a communication.—Sealed 4th January—6 months for inrolment.

John Swindells, of Manchester, manufacturing chemist, for certain improvements in the manufacture of artificial stone, cement, stucco, and other similar compositions.—Sealed 6th January—6 months for inrolment.

William Newton, of the Office for Patents, 66, Chancery-lane, civil engineer, for certain improvements in looms for weaving,—being a communication.—Sealed 6th January—6 months for inrolment.

John Rock Day, of Great Queen-street, Lincoln's Inn Fields, saddler's ironmonger, for certain improvements in the construction of collars for horses and other draft animals.—Sealed 6th January—6 months for inrolment.

Henry Gunter, of Cullum-street, Fenchurch-street, merchant, for improvements in preserving animal and vegetable substances.—Sealed 6th January—6 months for inrolment.

Henry Bessemer, of Perceval-street, Clerkenwell, for a new mode of checking the speed of or stopping railroad carriages, under certain circumstances.— Sealed 6th January—6 months for inrolment.

William Thompson, of Upper North-place, Gray's Inn Road, brushmaker, for improvements in the construction and mounting of various kinds of brushes and brooms.—Sealed 8th January—6 months for inrolment.

William Lacey, of Birmingham, agent for certain combinations of vitrified and metallic substances, applicable to the manufacture of ornaments and the decoration and improvement of articles of domestic utility and of household furniture; also applicable to church windows and ship lights.—Sealed 11th January—6 months for inrolment.

Matthew Uzielli, of King William-street, merchant, for improvements in impregnating and preserving wood and timber for various useful purposes,—being a communication.—Sealed 11th January—6 months for inrolment.

William Newton, of the Office for Patents, 66, Chancery-lane, civil engineer, for improved machinery for cleaning wheat and other grain or seeds from smut and other injurious matters,—being a communication.—Sealed 11th January—6 months for inrolment.

John Barwise, of St. Martin's-lane, chronometer maker, and Alexander Bain, of 35, Wigmore street, Cavendish-square, machinist, for their invention of improvements in the application of moving power to clocks and time-pieces.—Sealed 11th January—6 months for inrolment.

Thomas Harris, of Chiffnall, in the county of Salop, veterinary surgeon, for his invention of an improved horse-shoe.—Sealed 11th January—6 months for inrolment.

Joseph Hall, of Cambridge, grocer and draper, for his invention of a seed and dust disperser, which is particularly applicable to the freeing of corn and other plants from insects.—Sealed 14th January—6 months for inrolment.

Walter Hancock, of Stratford-le-Bow, in the county of Essex, engineer, for his invention of certain improved means of preventing accidents on railways—Sealed 14th of January—6 months for inrolment.

Pierre Armand, Le Comte de Fontainemoreau, of Skinner-place, Size-lane, for an improved machinery for carding and spinning wools and hairs, which he titles "Filo Finisher,"—being a communication.—Sealed 14th January—6 months for inrolment.

Melcher Garner Todd, of the Island of St. Lucia, for a certain improved form of apparatus for the distilling and rectification of spirits.—Sealed 14th January—6 months for inrolment.

John Loach, of Birmingham, brass-founder, for certain

improvements in castors, applicable to cabinet furniture and other purposes.—Sealed 14th January—6 months for inrolment.

William King Westly, of Leeds, flax machinist, for certain improvements in carding, combing, straightening, cleaning, and preparing for spinning, hemp, flax, and other fibrous substances.—Sealed 14th January—6 months for inrolment.

William Kenworthy, of Blackburn, spinner, and James Bullough, of the same place, overlooker, for certain improvements in machinery or apparatus for weaving—Sealed 14th January—6 months for inrolment.

Charles Cameron, Esq., of Mount Vernon, Edinburgh, for certain improvements in engines, to be actuated by steam and other elastic fluids.—Sealed 14th January—6 months for inrolment.

Samuel Hall, of Basford, Nottingham, civil engineer, for improvements in the combustion of fuel and smoke.—Sealed 14th January—6 months for inrolment.

Alexander Jones, of King-street, London, engineer, for improvements in the manufacture of copper tubes and vessels.—Sealed 14th January—6 months for inrolment.

Edward Foard, of Queen's Head-lane, Islington, machinist, for an improved method or improved methods of supplying fuel to the fire-places or grates of steam-engine-boilers, brewers' coppers, and other furnaces, as well also to the fire-places employed in domestic purposes, and generally to the supplying fuel to furnaces or fire-places in such a manner as to consume the smoke generally produced in such furnaces or fire-places.—Sealed 16th January—6 months for inrolment.

John Annes, of Plymouth, painter, for a new and improved method of making paint from materials not before used for that purpose.—Sealed 16th January—4 months for inrolment.

James Smith, of Deanstone Works, Kilmadock, Perth, cotton-spinner, for certain improvements in the preparing, spinning, and weaving of cotton, silk, wool, and other fibrous substances, and in measuring and folding woven fabrics, and in the machines and instruments for these purposes.—Sealed 19th February—6 months for inrolment.

Thomas Robinson, of Wilmington-square, Middlesex, Esq., for improvements in drying woollen and other fabrics.—Sealed 19th January—6 months for inrolment.

Thomas Vaux, of Frederick-street, Gray's-Inn-lane, worsted manufacturer, for improvements in horse-shoes.—Sealed 19th January—6 months for inrolment.

Caleb Bedells, of Leicester, manufacturer; Christopher Nickels, of York-road, Lambeth, Gent., and Archibald Turner, foreman to the said Caleb Bedells,—for improvements in the manufacture of braids and plats,—being partly a communication.—Sealed 19th January — 6 months for inrolment.

John Barber, of Manchester, engraver, for certain improvements in machinery, for the purpose of tracing or etching designs or patterns, on cylindrical surfaces.—Sealed 19th January—6 months for inrolment.

Frederick Steiner, of Hyndburn Cottage, Lancaster,—Turkey-red dyer, for improvements in looms for weaving and cutting asunder double piled cloths; and a machine for winding weft, to be used therein,—being a communication.—Sealed 19th January—6 months for inrolment.

John Cox, of Gregorie Mills, Edinburgh, tanner, for improvements in apparatus for assisting or enabling persons to swim, or float, or progress in water.—Sealed 19th January—6 months for inrolment.

Charles Berwick Curtis, of Acton, in the county of Middlesex, Esq., for a method or methods of making signals by self-acting apparatus, to be used on railways, for the

purpose of obviating collisions between successive trains.—Sealed 19th January—6 months for inrolment.

Angier March Perkins, of Great Coram-street, engineer, for improvements in apparatus for heating by the circulation of hot water, and for the construction of pipes and tubes for such and other purposes.—Sealed 21st January—6 months for inrolment.

John Melville, of Upper Harley-street, Esq., for improvements in propelling vessels.—Sealed 21st January—6 months for inrolment.

William Hill Darker, Sen. and William Hill Darker, Jun., both of Lambeth, engineers, and William Wood, of Wilton, carpet manufacturer, for certain improvements in looms for weaving.—Sealed 21st January—6 months for inrolment.

John Bradford Furnival, of Street Ashton, Warwick, farmer, for improvements in the construction and application of air vessels,—being a communication.—Sealed 21st January—6 months for inrolment.

William Cooper, of Layham, Suffolk, iron-founder, for an improved method of constructing thrashing machines and other agricultural instruments.—Sealed 21st January—2 months for inrolment.

Isham Baggs, of Cheltenham, gentleman, for improvements in printing.—Sealed 23rd January—6 months for inrolment.

Peter Fairbairn, of Leeds, engineer, and William Suttill, of the town of Newcastle-upon-Tyne, flax spinner, for certain improvements in drawing flax, hemp, wool, silk, and other fibrous substances.—Sealed 26th January—6 months for inrolment.

Edward Henshall, of Huddersfield, carpet manufacturer and merchant, for certain improvements in making, manufacturing, or producing carpets and hearth rugs.—Sealed 26th January—4 months for inrolment.

Nathaniel Lloyd, of Manchester, and Henry Rowbotham, of the same place, calico printer, for certain improvements in thickening and preparing colours for printing calicoes and other substances.—Sealed 26th January—6 months for inrolment.

Nathan Waddington, of Hulme, Lancaster, engineer, for certain improvements in the construction of steam-boilers, and furnaces for heating the same.—Sealed 26th of January—6 months for inrolment.

Cornelius Alfred Jaquin, of Huggin-lane, for improvements in the manufacture of covered buttons; and in preparing of metal surfaces for such manufacture, and other purposes.—Sealed 26th January—6 months for inrolment.

John Bradford Furnival, of Street Ashton, farmer, for improvements in evaporating fluids, applicable to the manufacture of salt, and to other purposes where evaporation of fluids is required,—being a communication.—Sealed 26th January—6 months for inrolment.

Richard Jenkyn, of Hoyle, Cornwall, machinist, for certain improvements in valves, for hydraulic machines.—Sealed 26th January—6 months for inrolment.

William Gall, of Beresford-terrace, Walworth, gentleman, for certain improvements in the construction of locomotive engines, and of the carriages used on railways, applicable in part to carriages used on common roads,—being a communication.—Sealed 28th January—6 months for inrolment.

William Currie Harrison, of Newland-street, Eaton-square, Pimlico, engineer, for an improved turning table, for railway purposes.—Sealed 28th January—6 months for inrolment.

Joseph Prior, Wendron, Cornwall, builder, for an improved thrashing machine.—Sealed 28th January—6 months for inrolment.

AN

ANALOGICAL INDEX

TO THE

SUBJECTS CONTAINED IN THE TWENTY-THREE VOLUMES,

COMPRISING THE

FIRST AND SECOND SERIES OF THE

LONDON JOURNAL OF ARTS AND SCIENCES;

EMBRACING

Every Invention patented in England, from the beginning of the Year 1820 to 1830, with a great variety of other interesting subjects connected with the Arts and Manufactures.

N.B.—The references to the volumes, which are marked with an asterisk (*), indicate the Second Series; those without that mark refer to the First Series.

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—— plough for underdraining land—Cowper's patent: vol. i. p. 13.

—— drills to be affixed to ploughs—Torey's patent: vol. ii. p. 16.

—— machine for cutting and prepar-

ing lea ground—Thomas and Lobb's patent: vol. ii. p. 250.
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